

**City of Seattle
Municipal Stormwater NPDES Permit**

2002 Annual Report

Providing an update on the status of stormwater program activities conducted during 2002 with updates, as appropriate, for 2003.

Submitted pursuant to Special Condition S10 of the National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit for discharges from municipal separate sewers for the Cedar/Green Water Quality Management Area.

Municipal Stormwater NPDES Permit No. WASM 23003



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August 29, 2003

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2002 Stormwater Management Program Update Report

1. INTRODUCTION

This report is submitted by the City of Seattle pursuant to Special Condition S10 of the National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit for discharges from municipal separate storm sewers for the Cedar/Green Water Quality Management Area. Seattle received coverage under the NPDES Municipal Discharge Permit from Washington State Department of Ecology (Ecology) in 1995. In 1997, Seattle's Stormwater Management Program (SWMP) was approved by Ecology as meeting the requirements of that permit. The report, highlighting various stormwater runoff management activities conducted by the City of Seattle, covers the 12-month period between January 1, 2002, and December 31, 2002, with updates as appropriate through mid-2003.

This report is divided into four sections.

1. Background: Stormwater and the City of Seattle. This section contains an overview of the nature of urban stormwater runoff and the challenges facing fully built environments like Seattle. It also provides an overview of the organizational responsibilities of key departments in the City involved in stormwater management and water quality.
2. Seattle's Stormwater Management Program Components. In this section, the various elements of Seattle's stormwater programs are summarized. Accomplishments during the reporting period are included and, for readers desiring additional information, a point of contact is provided for each program element.
3. Other Permit Reporting Requirements. The City's NPDES Municipal Stormwater Discharge Permit contains mandatory reporting elements that do not properly fit under one of the program headings in the previous section. These mandatory reporting elements are included in this section. Examples include as fiscal analysis and changes in permit coverage area.
4. Next Steps. This section reflects on the challenges of stormwater management in the City of Seattle.

Two appendices are included at the end of this report:

- o Appendix A provides a listing of current stormwater management programs and staff points of contact
- o Appendix B cross-references the reporting requirements contained in the 1995 NPDES Municipal Stormwater Permit with the appropriate sections contained in this report

Comments or questions regarding the overall organization or content of the report can be directed to Robert D. Chandler, Ph.D., Seattle Public Utilities Resource Planning Division, at 206-684-7597 or robert.chandler@seattle.gov

2. BACKGROUND: CITY OF SEATTLE AND STORMWATER

2.1 STORMWATER AND THE URBAN ENVIRONMENT

Urban stormwater runoff is the water that runs off surfaces such as rooftops, paved streets, highways, and parking lots. Runoff can also come from graveled areas and hard grassy surfaces like lawns and play fields. Urban stormwater runoff can be a problem for several reasons.

Flooding: In less urban areas, much of the rainfall is intercepted by trees and vegetation or infiltrated into the soil. In urban areas like Seattle, most of the rainfall remains on the surface where it can collect in low-lying areas and cause flooding.

Human Health: Untreated stormwater can contain toxic metals, organic compounds, and bacterial and viral pathogens. Untreated stormwater generally is not of drinking water quality and can lead to closures of swimming areas.

Aquatic Environment: In urban areas, our creeks, streams, and rivers can be harmed by urban stormwater. Because so little of the rainfall is intercepted or infiltrated, high volumes of runoff can arrive in these water bodies causing erosion and sedimentation. Stormwater can also adversely affect water quality by carrying the pollution from roadways, lawns, and business activities.

In Seattle, as it collects on roadways, lawns, gutters, and other impervious surfaces, stormwater begins to flow through a variety of systems. These include:

Natural Drainage System: Swales, ravines, and stream corridors such as Thornton Creek or Longfellow Creek are all examples of natural drainage systems. Natural drainage systems cross privately and publicly owned property.

Ditch and Culvert System: This kind of system involves a combination of surface ditches and culverts usually located in the public right-of-way that convey stormwater to a natural drainage system or a public storm drain.

Public Storm Drain: This public drainage system is wholly or partially piped and is designed to carry only stormwater. Public storm drains convey stormwater to a natural drainage system or directly to receiving waters such as Lake Union or Lake Washington.

Public Combined Sewer: Seattle's Combined Sewer System conveys both stormwater and wastewater through a system of pipes to King County's treatment facility at West Point. The treated water is released into Puget Sound.

To meet the challenges of urban runoff, urban areas like Seattle must implement comprehensive stormwater management programs. These programs include capital projects to address both flooding and water quality concerns, maintenance activities to keep facilities functioning properly, and a range of programs designed to influence the actions of everyone who works or lives in the watershed. Many of these programs, primarily those related to the *quality* of the stormwater (as opposed to the *quantity* of stormwater) are described in this report.

2.2 SEATTLE DEPARTMENTS INVOLVED IN STORMWATER MANAGEMENT

Among the many departments serving Seattle, the four departments and one office described below are most involved in programs and projects relating to stormwater management and receiving water impacts.

Seattle Public Utilities

Seattle Public Utilities (SPU) was formed in 1997 during a municipal reorganization that placed the four rate-supported utility services of solid waste, drinking water, wastewater and drainage into one City department. Prior to the reorganization, Seattle Engineering Department's Drainage and Wastewater Utility (DWU) performed drainage planning. Today, SPU is the designated lead department for managing stormwater, including meeting stormwater regulatory requirements, conducting water quality programs, and managing drainage-related capital projects.

Department of Design, Construction & Land Use

The Department of Design, Construction and Land Use (DCLU) is the City department responsible for developing, administering, and enforcing development standards. It is DCLU that issues development permits as required under Seattle's Stormwater, Grading and Drainage Control Code (Seattle Municipal Code 22.800 – 22.808) and inspects sites prior to and during construction. As part of the side sewer permit, inspections and complaints program transfer, DCLU is currently doing the permitting and inspections. It was agreed that SPU would eventually manage customer complaints and inquiries (investigation and response) for non-permit work. Complaint handoff to DCLU will occur when a Notice of Violation needed to be issued. All complaints and inquiries related to existing side sewer facilities would be directed to SPU Customer Service.

Seattle Department of Transportation

Seattle Department of Transportation (SDOT) is responsible for the City's streets and bridges, bike paths, street trees, traffic operations. SDOT performs such roadway maintenance activities as street sweeping and snow and ice control, and is currently responsible for issuing permits for side sewers to connect to the City's mainline system. The Capital Projects Division of SDOT oversees all aspects of Transportation CIPs and coordinates development and implementation of large-scale city projects.

Office of Sustainability and the Environment

The Office of Sustainability & Environment (OSE) was created in the fall of 2000 to help put sustainability into practice, both within City government and in the community at-large. While OSE's primary focus is on "municipal sustainability" (more sustainable City operations, facilities, and services), this office also seeks to promote and increase "community sustainability" (more sustainable practices by businesses, other institutions, and individual households and citizens). One of OSE's mission is to provide leadership, tools, and information to help City government and other organizations use natural resources efficiently, prevent pollution, and improve the economic, environmental, and social well-being of current and future generations. Among the more recent endeavors has been a citywide effort to reduce pesticide use.

Seattle Parks and Recreation

Responsible for several hundred parks and park facilities, Seattle's Department of Parks and Recreation (SPR) is a key player in environmental stewardship. During 2001, SPR trained its staff in comprehensive Best Management Practices for various maintenance activities, reduced

pesticide use, worked to remove invasive plants and replant native species, and continued its partnership with Seattle Public Utilities on creek improvement projects. Highlights of SPR's accomplishments during 2002 can be found in its annual report, which is available at <http://www.cityofseattle.net/parks/Publications/annualreport.htm>.

3. STORMWATER MANAGEMENT PROGRAM COMPONENTS

In this report, Seattle's stormwater- and water quality-related programs are organized into twelve functional categories as shown in Figure 1. The categories are:

Comprehensive Stormwater Planning: Includes planning processes underway used to further develop and enhance Seattle's stormwater management programs.

Partnerships: Activities aimed at coordinating stormwater-related policies, programs, and projects among jurisdictions within a watershed, and among Seattle's departments sharing similar responsibilities.

Regulations and Technical Standards: Seattle's ordinances and SPU/DCLU Directors' Rules are designed to control runoff from new development, redevelopment, and construction activities. Regulations also address source control and pollution prevention at existing commercial and residential areas.

Permitting, Inspections, and Enforcement: Programs that ensure proper application of and compliance with adopted regulations and standards.

Pollution Prevention: These programs are aimed at reducing or eliminating pollution before it can be picked up by stormwater runoff and conveyed to receiving waters.

Illicit Discharge Reduction: An illicit discharge occurs when something other than stormwater is allowed to enter one of our conveyance systems. The programs listed under this category are hazardous spill response and illegal dumping.

Public Involvement, Education and Stewardship: In this category are the variety of programs whose purpose is to provide opportunities for individuals and groups to become involved in environmental and water quality activities, and learn how to be better stewards of our natural resources.

Operations and Maintenance – Drainage System: These programs help Seattle maintain its public drainage infrastructure.

Operations and Maintenance – Roadways: In this category are described the programs operated by SDOT to reduce stormwater impacts from public streets.

Municipal Training: Training occurs throughout many of the programs within other programmatic categories. Under this category is listed a new training program specifically aimed at improving drainage system maintenance.

Information & Data Collection, Analysis & Management: This category includes many of the programs that collect and compile information needed to evaluate performance of programmatic activities and to assess the effectiveness of policies, standards, programs, and projects over time.

Capital Improvement Program: This category includes primarily SPU-sponsored capital projects involving facilities or other improvements that address stormwater impacts.

Additional details on these programs are provided in this report.

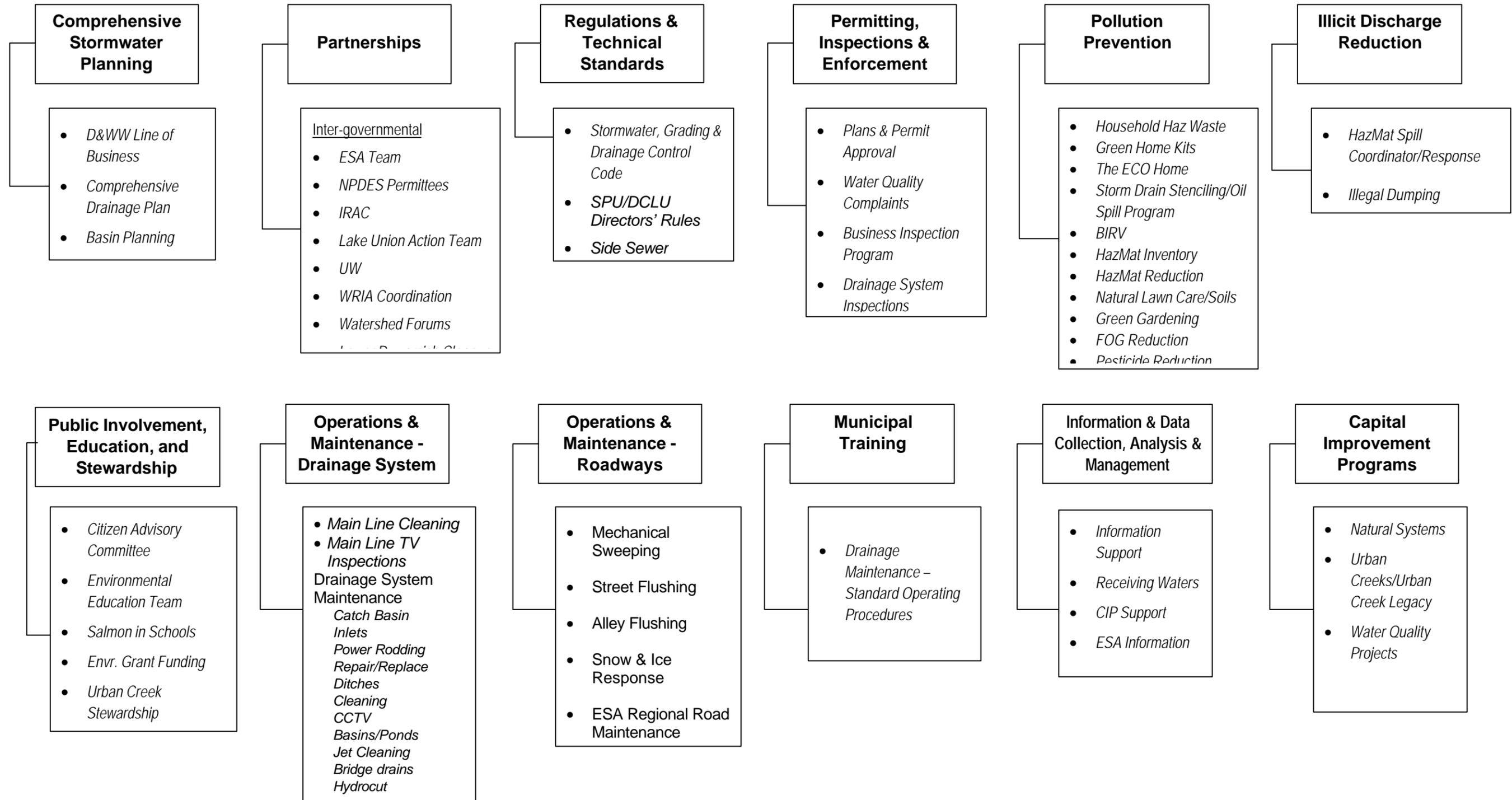


Figure 1. City of Seattle Stormwater Management Programs

3.1 COMPREHENSIVE STORMWATER PLANNING

SPU, as the lead stormwater management department for the City of Seattle, is involved in a number of planning endeavors designed to improve delivery of services and enhance environmental quality. Highlights of major planning efforts are provided below.

3.1.1 Drainage and Wastewater Line of Business

In 2001, SPU formed the Drainage & Wastewater Line of Business Team and charged it with integrating programs and services across all SPU branches and divisions. To begin meeting this goal, the D&WW LOB conducted an assessment of drainage programs, services and core businesses. This assessment, completed in June 2002:

- Identifies key challenges following an analysis of the current state of service delivery;
- Defines core service areas;
- Aligns efforts with the Mayor's and SPU Director's focus on assets, operations, and customer service; and,
- Develops goals and identifies strategic directions to move toward over the next five years.

One of the most important strategic directions in 2002 was to initiate an update to the 1995 Comprehensive Drainage Plan (Section 3.1.2).

Denise Andrews (206) 684-4601

3.1.2 Comprehensive Drainage Plan Update

In early 2002, SPU began a two-year project to update its 1995 Comprehensive Drainage Plan (CDP). When complete, the new CDP will chart a 20-year course for SPU's Drainage Programs, prioritizing key action items, and addressing how best to meet the city's goals for surface water management. The CDP will include:

- A vision for surface water management that includes Seattle creeks, shoreline, and lakes as well as traditional drainage infrastructure;
- A fully developed Natural System Program that optimizes water quality and quantity management and mobility goals in the right-of-way;
- A framework to integrate city-wide drainage needs and services;
- A resolution of key issues related to surface water management; and
- A robust 6-year drainage CIP with recommendations for operational and enforcement programs that meet stormwater NPDES permit requirements.

The CDP will also define basic drainage services to be provided to the Seattle ratepayers, including:

- Public safety as it relates to drainage;
- Protection and, where feasible, enhancement of water quality and habitat for key aquatic resources;

- Response to regulatory requirements; and
- Management of public investment of the drainage infrastructure.

These services will be applied in a manner that reflects geographic differences within the city and the corresponding service needs. Links with other City Departments and the services they provide will be created in order to optimize benefits to ratepayer.

The CDP will also address long-standing policy and planning needs, including:

- The need to more effectively coordinate and prioritize drainage services on a citywide basis to optimize ratepayers' dollars. This includes the identification and coordination of capital projects within the Drainage Program;
- The need to balance capital projects, field maintenance, and other programmatic efforts (e.g., education) to meet surface water management goals;
- The need to define clear policies related to the work we do, including funding.

Early draft sections of the Comprehensive Drainage Plan are currently under internal review.

Darla Inglis (206) 233-7160

3.1.3 Basin Planning

Norfolk Drainage Basin

The Norfolk Basin Drainage Study is being developed to provide an organized and systematic implementation plan for future improvements in the 800-acre South Norfolk drainage basin. The Drainage Study evaluates the existing drainage system, identifies existing problem areas, develops improvement alternatives, and recommends a phased capital improvement plan. The Drainage Study and modeling were completed in May 2002 and the Study has recommended a capital project phasing plan for drainage improvements over the next 20 years. The water quality component to the Norfolk Drainage Plan is currently in progress.

Beth Schmoyer (206) 386-1199

South Park Drainage Basin

A drainage improvement study has been completed for the South Park drainage basin. It provides hydraulic analysis and report of alternatives to address flooding problems in the South Park basin. The objectives of the project are:

- Prepare a comprehensive surface water drainage plan for South Park in Southwest Seattle;
- Coordinate that plan with other adopted neighborhood plan objectives;
- Support Seattle Public Utilities (SPU) in setting drainage policies and selecting future capital improvements specific to this drainage basin;
- Propose projects to provide a formal drainage system; and
- Recommend a specific project to reduce flooding adjacent to the Duwamish River between 2nd Ave S and 7th Ave S.

In light of the hydraulic study, a water quality project is currently underway to evaluate both structural and nonstructural options to improve stormwater quality in the basin and mitigate impacts on the Duwamish River, a Superfund site. This project is one of the five new "early action" projects proposed as a result of SPU's work on the Comprehensive Drainage Plan Update. The cost of this project is absorbed within the existing Protection of Beneficial Uses CIP program in 2004 by using savings from other projects.

Sahba Mohandessi (206) 684-7592

Densmore Drainage Basin

The Densmore Drainage Basin Study completed in May 2003 included analyzing the storm drainage system in the Densmore Basin to its discharge into Lake Union. That portion of the system upstream from the diversion structure allowing flows to enter Green Lake is referred to as the Densmore Drain North. Densmore Drain South consists of Green Lake, and King County's drain south of the Densmore diversion structure including the Densmore Pump Station, force main and gravity outlet to Lake Union. The study provided hydraulic analysis and report of alternatives to address flooding problems in the upper basin and assessed the water level impacts on Green Lake. This study does not include addressing flooding problems around Green Lake or I-5, or basins that contribute to the pump station.

A water quality study is currently underway to provide SPU with recommendations for improving water quality in the Densmore basin through stormwater pollution prevention efforts (e.g., source control) and capital improvement projects (CIPs) for stormwater treatment. It will also identify potential limnological and water quality impacts to Green Lake for two of the drainage improvement alternatives/scenarios proposed in the Densmore basin hydraulic.

Sahba Mohandessi (206) 684-7592

Thornton Creek – Basin-wide Flow Control Plan

The principal objectives of the Thornton Creek Basin-wide Flow Control Plan are to identify options to control flooding and improve fish and wildlife habitat. The detailed analysis of Thornton Creek hydrologic conditions began in 1998 with a limited reconnaissance and initial stream gauging at selected locations. Flow data collected during the period of study were then used to calibrate hydrologic and hydraulic models. Three separate models were selected to simulate runoff response of the Thornton Creek basin and flow routing through principal conveyance systems. The three models were: the Expert Stormwater management Model (XP-SWMM), the Hydrologic Simulation program – FORTRAN (HSPF), and the Hydraulic engineering Center – River Analysis System (HEC- RAS). The calibrated models were used to establish existing conditions and predict problem areas. Potential solutions were then developed to address the identified problems. A Draft Report was completed in April 2001 documenting the hydraulic analysis and alternatives evaluation performed for the drainage basin. Results from the draft report will be used to identify future CIP projects.

Neil Thibert (206) 684-7589

3.1.4 Public Participation in Planning Processes

(See 3.7.1, Citizen Advisory Committee)

3.2 PARTNERSHIPS

Managing stormwater, reducing pollution, and improving the conditions of our receiving waters involves the combined efforts of many Seattle's departments as well as partnerships with other jurisdictions. Most of these collaborative efforts are described elsewhere in this report.

3.2.1 Intergovernmental Coordination

Below are some selected examples of how the City of Seattle is involved in partnerships with other jurisdictions sharing responsibilities within our watersheds.

ESA Team

In May 1999, the National Marine Fisheries Service (NMFS) listed the Puget Sound chinook salmon (*Oncorhynchus tshawytscha*) as *threatened* under the Endangered Species Act (ESA) and in December 1999 the US Fish and Wildlife Service (USFWS) added the coastal bull trout (*Salvelinus confluentus*) to the threatened list. In response, an interdepartmental, citywide ESA Team was formed. The ESA team focuses on five primary issues: (1) negotiations with NOAA Fisheries and United States Fish and Wildlife Service (USFWS), (2) regional coordination with Shared Strategy and Tri-County, (3) supporting regional watershed action planning, (4) developing salmon research and habitat investments designed to protect and restore Seattle's major aquatic environments, and (5) departmental implementation of best management practices and appropriate mitigation of capital projects. This Team reports to the Directors of SPU, City Light, SDOT, Parks, and Design/Construction and Land Use, and to the Mayor's Office.

Martin Baker (206) 684-5984

Coordination among NPDES Municipal Stormwater Permittees

The City of Seattle is a regular participant in the NPDES Municipal Stormwater Permittee Interagency Working Group, an ad hoc collective whose members represent all the current NPDES municipal stormwater-permitted jurisdictions in the State of Washington, as well as the Port of Seattle, Port of Tacoma, and the Washington State Department of Ecology. In early 2002, this group met periodically to discuss and coordinate stormwater management programs and NPDES municipal stormwater permit issues. In 2002, Ecology adjusted its work plan away from developing a new Phase I NPDES permit, prioritizing its limited resources instead on producing a Stormwater Management Manual for Eastern Washington, working toward a Phase II NPDES Municipal Permit, and addressing other emerging legal issues. Since then, the NPDES Phase I Interagency Working Group has not had occasion to meet. Recently (August 2003), Seattle has been chosen as one of 20 representatives on the Westside Stormwater Group. This group is working with Ecology to produce a report to the Washington State Legislature summarizing the range of perspectives on stormwater permitting and management issues, identifying alternative courses of action and their implications, and delineating areas of agreement and disagreement.

Robert Chandler (206) 684-7597

Interagency Regulatory Analysis Committee

Seattle Public Utilities regularly participates in the Interagency Regulatory Analysis Committee (IRAC). IRAC began in mid-1993 as a forum for state and local regulatory agencies to share their diverse regulatory perspectives. IRAC's mission is to create a more effective and efficient means of protecting the environment, public health and safety through coordination of regulatory

agencies. A primary goal of IRAC is to collaborate with other institutions to address gaps, overlaps and inconsistencies relating to regulatory issues. One representative of SPU is presently serving on the IRAC Advisory Committee. SPU is also actively involved in three IRAC workgroups: Outdoor Restaurant Grease Workgroup, Troublesome Sites Workgroup and the Lead Workgroup.

Ellen Stewart (206) 615-0023

Lake Union Action Team

The Lake Union Action Team (LUAT), which was formed in 1988 as part of Ecology's Urban Bay Action Program, was chaired by SPU until September 2001. The goals of the Urban Bay Action Program include protecting ecosystems from further degradation, restoring damaged areas, and protecting the beneficial uses of the water body. The Lake Union Action Team is a multi-agency body that supports the goals of the Urban Bay Action Program by coordinating regulatory and source control efforts in the Lake Union drainage basins. Local, state and federal regulators involved with the Lake Union watershed meet on a bimonthly basis. In addition to SPU, members of the Lake Union Action Team include representatives from Seattle Parks and Recreation, Seattle Department of Design, Construction and Land Use, King County Industrial Waste Program, King County Hazardous Waste Program, King County Wastewater Treatment Division, Port of Seattle, Washington State Department of Ecology, Washington State Department of Natural Resources, Washington State Department of Fish and Wildlife, Washington State Department of Transportation, US Environmental Protection Agency, and the US Army Corps of Engineers.

Robert Chandler (206) 684-7597

University of Washington Center for Water and Watershed Studies

Seattle Public Utilities serves on the Advisory Panel for the Center for Water and Watershed Studies. On September 1, 2002, the Center for Streamside Studies and the Center for Urban Water Resources Management merged, providing an opportunity for a strong regional center on water and watershed studies to develop. Renamed the Center for Water and Watershed Studies (CWWS), its mission is to conduct research, education, and information transfer the broader umbrella of regional watershed studies and encompassing diverse aquatic and human environments. Currently, the CWWS is a source of comprehensive aquatic resources and water management information to maintain and enhance the earth's watersheds. The research of the Center provides models for addressing both regional and global watershed issues, bringing together science and policy studies for publication and for discussion in courses, seminars, and workshops. CWWS is a broad, collaborative community of environmental scholars, achieving its goals through research, education, and information transfer.

Darla Inglis (206) 233-7160

Local Hazardous Waste Management Program

Seattle is an active participant in the Local Hazardous Waste Management Program (LHWMP) in King County, an interagency partnership that includes SPU, the Water and Land Resources and Solid Waste divisions of King County's Department of Natural Resources, the Public Health Department of Seattle and King County, and the Suburban Cities Association.

Kathy Minsch (206) 615-1441

Watershed Resource Inventory Area (WRIA) Coordination

The City of Seattle continues to be actively involved in Watershed Resource Inventory Area (WRIA) planning. The jurisdiction of the city of Seattle is contained in WRIA 8 (Cedar/Lake Washington) and WRIA 9 (Green/Duwamish). Owing to municipal operations in other areas outside the city's limits, Seattle is also active in WRIA 7 (Tolt/Snohomish), WRIs 3 & 4 (Upper & Lower Skagit), and WRIA 62 (Pend Orielle). SPU has two full-time, senior-level WRIA coordinators (WRIA 8 & 9), and Seattle City Light has allocated staff to WRIs 3, 4, 7 and 62. WRIA planning efforts work to build inter-jurisdictional coalitions and to integrate citywide efforts within each WRIA. The WRIA planning bodies have focused planning agendas on developing baseline salmon habitat assessments and recovery plans, which have included identifying watershed-wide informational needs and limiting factors to salmon recovery. In February 2002, WRIA 8 produced a Draft Near-Term Action Agenda for Salmon Habitat Conservation and in May 2002 WRIA 9 issued its final Near-Term Action Agenda for Salmon Habitat Conservation. These documents are the product of over a year of collaborative discussions among elected officials, jurisdictional staff, business and environmental groups, scientists, and concerned citizens. They are intended to provide guidance to local governments and interested organizations and citizens on interim measures that can be undertaken in the near-term while longer-term conservation plans are being developed.

WRIs 8 and 9 are currently conducting their strategic assessments, which will provide a scientific basis for developing salmon recovery actions. WRIA 8 is using an ecosystem model, Ecosystem Diagnosis and Treatment (EDT) to assess Lake Washington basin habitat conditions, with final modeling results expected in October 2003. WRIA 9 is currently assessing both current and historic habitat conditions to provide insight for developing their salmon recovery projects. Close coordination with the Puget Sound Nearshore Ecosystem Restoration Project has allowed the WRIA to place emphasis on marine nearshore habitats, in addition to the freshwater ecosystem. Additional information for WRIs 8 and 9 can be found at <http://dnr.metrokc.gov/WRIAS>.

Sarah McKearnan, WRIA 8 (206) 615-0567; Judith Noble, WRIA 9 (206) 684-8078; Scott Powell, WRIA 7 (206) 386-4582; Ed Connor, WRIs 3&4 (206) 615-1128

Watershed Forums

The Seattle's elected officials and staff have participated in local Watershed Forums since their inception several years ago. These Forums were initially formed an outgrowth of the Regional Needs Assessment for surface water management, and were originally tasked to address surface water management needs, including flooding and water quality. The Forums were later expanded to also address salmon and related habitat issues and in 2001 they were formally aligned with the WRIA planning processes. The purpose of these Forums is to:

- Provide an opportunity for all local governments that share the watershed to discuss salmon habitat and water quality issues;
- Provide overall direction for joint efforts to recover salmon habitat;
- Allocate King Conservation District funds to salmon habitat projects and activities important to the entire WRIA; and
- Provide oversight for the jointly funded staff working on salmon habitat planning.

The boundaries of Seattle lie within the Lake Washington/Cedar/Sammamish Forum (WRIA 8) and the Green/Duwamish and Central Puget Sound Watershed Forum (WRIA 9). [Note that in 2001, the Central Puget Sound Subforum was incorporated into the Green/Duwamish Forum.] Interlocal agreements have been signed through which all jurisdictions are financially supporting the WRIA planning process. King Conservation District funds, allocated through the Forums, support projects for salmon recovery, in some cases supplying the local match for Salmon Recovery Funding (SRF) Board grants.

Sarah McKearnan, WRIA 8 (206) 615-0567; Judith Noble, WRIA 9 (206) 684-8078.

Lower Duwamish River Sediment Cleanup and Restoration

The City is preparing a Remedial Investigation of the Lower Duwamish in partnership with King County, the Port of Seattle, and Boeing. This work is being done under an Agreement on Consent (AOC) with EPA and Ecology under the Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund) and the Washington State Model Toxics Control Act (MTCA). Phase I of the Remedial Investigation has been completed, resulting in the identification of 8 candidate sites for early cleanup action. SPU is also a member of the multi-jurisdictional Elliott Bay/Duwamish Restoration Panel (EBDRP), which was created as a result of a consent order settling Natural Resource Damages claims. EBDRP includes representatives from NOAA, US Fish and Wildlife, the Muckleshoot and Suquamish tribes, the Department of Ecology, King County and the City of Seattle. It prioritizes and funds clean-up and restoration projects on the Duwamish River using City and County funds contributed as part of the settlement. It has funded a clean-up project at the Norfolk site, removing 5500 cubic yards of contaminated sediment for disposal. Habitat projects include habitat restoration at the Seaboard Lumber site and other locations. The Diagonal/Duwamish clean up will begin early in 2004 and will be funded as an EBDRP project.

Martin Baker (206) 684-5984

3.3 REGULATIONS & TECHNICAL STANDARDS

3.3.1 Stormwater, Grading and Drainage Control Code and Directors' Rules

In July 2000, the City revised its Stormwater, Grading and Drainage Control Code (Seattle Municipal Code 22.800 - 22.808) and associated Directors' Rules for Flow Control, Stormwater Treatment, Source Control, and Construction Stormwater Management. Now fully in effect, the Code and Directors' Rules can be viewed on the City's Website:

<http://www.ci.seattle.wa.us/dclu/Codes/sgdcode.htm>

Beginning in early 2002, Seattle Public Utilities, working in partnership with Seattle Department of Transportation (SDOT) and the Department of Design, Construction and Land Use (DCLU), began identifying where changes in the City's 2000 Stormwater Code may be warranted in light of Ecology's Stormwater Management Manual for Western Washington (August 2001). The long-term goal of this project is to develop a revised set of technical standards and code requirements for stormwater flow control, treatment, construction and source control that account for Seattle's built environment and development patterns while, at the same time, taking advantage of Ecology's revised guidelines. This project is being conducted in conjunction with development of SPU's Comprehensive Drainage Plan.

Robert Chandler (206) 684-7597

3.3.2 Side Sewer Code

Seattle Municipal Code 21.16, the Side Sewer Code, prohibits certain discharges into the City's public sewer system, drain, ditch, or natural outlet. Included in the list of prohibited discharges are: fats, oils, grease, high temperature liquids, flammables and oils, toxic and poisonous substances, garbage, sand, and mud.

Robert Chandler (206) 684-7597

3.4 PERMITTING, INSPECTIONS & ENFORCEMENT

3.4.1 Drainage Plans and Permit Approval

Development permits are issued by Seattle's Department of Design, Construction and Land Use (DCLU). The Drainage and Sewer Desk of DCLU is staffed by Senior Civil Engineering Specialists who provide technical advice on grading, side sewer and drainage components of construction projects. In 1999 DCLU conducted an internal reorganization, combining the teams that conducted drainage and Environmentally Critical Area project review with the teams that conducted on-site inspections. This particular DCLU group is called the *Site Development Services (SDS)* team. The intent was to bring all the necessary skills associated with site development into one team to perform a comprehensive project review and Inspection. The SDS team currently consists of a supervisor, three drainage reviewers, seven senior site inspectors, three geo-technical engineers and an environmental biologist.

Special concerns of the Site Development Services team are construction in Environmentally Critical Areas (ECA), shorelines and in the drainage basins of the five major creeks of Seattle. In 2000, DCLU initiated a new program that required Pre-application Site Visit (PASV) inspections for all proposed construction projects (prior to submittal of development plans to DCLU) where the existing ground condition or vegetation will be disturbed. These PASV are generally done within 48 hours of DCLU receiving a PASV and Addressing application. The site visit is designed to verify actual on-site conditions, including topography, soils, environmental impacts, specific concerns, and the types of special reports needed (topographic survey, wetland, etc).

The SDS team has expanded its services by incorporating the Side Sewer function in February 2003. This has consolidated the drainage review with side sewer permitting (that included drainage permits) and inspections as relates to site development under one agency and help to improve control of soil erosions as a result of utility work. Previously side sewer permitting and inspection was conducted by another Department. The Hansen software has been developed for side sewer permitting and inspecting at DCLU and provides a comprehensive permit tracking system to effectively evaluate the impervious surface additions as a result of site construction.

Ken Watanabe (206) 233-7912

3.4.2 Water Quality Complaints

SPU surface water quality investigators respond to water quality-related complaints within the City limits. The complaints originate from citizens who call the City's hotline (684-7587), staff reports and referrals from other departments and agencies. When the team responds to a complaint, every attempt is made to determine the responsible party and stop the polluting action. Inspectors also provide technical assistance on applicable best management practices,

clean up and disposal options and education on relevant code information. If practical, the responsible party is required to clean up the polluting material. When necessary, the investigator requests that City maintenance crews sweep the street, clean catch basins, or perform other operations. All complainants, if requested, are notified of investigation results.

SPU water quality investigators received 300 surface water quality complaints in 2002 and 145 between January 1 and June 30, 2003. A summary of the water quality complaints received during 2002 and the first 6 months of 2003 are provided in Table 1.

Table 1. Summary of Water Quality Complaints

Type of Action	January 1 to December 31, 2002	January 1 to June 30, 2003
Water Quality Complaints	300	145
Resolved	218	90
Unresolved	82	55

In 2002, the most frequent water quality complaint involved discharges of chemicals (44%), which includes automotive fluids, oil, paint and unknown chemicals. This was followed by the category 'other' (41%), which includes miscellaneous discharges and grease. Debris (construction, commercial and residential) accounted for 7% of the complaints, while sewage constituted 5% and erosion 3%. These trends continue for 2003 (chemicals 48%, other 42%, debris 4%, sewage 6%, erosion 0%).

Cases are classified in the database as unresolved or resolved. In 2002, 218 cases were resolved, while 82 cases remained unresolved. In 2002, the criteria for "resolved versus unresolved" was changed to better reflect the team's services. A case is considered resolved if education and technical assistance are provided to the alleged violator(s) and/or the case is referred to an appropriate department or agency. The case is considered unresolved if the problem cannot be found or confirmed by SPU inspectors or if the original source cannot be identified. There is currently about 1 FTE assigned to this program.

Ellen Stewart (206) 615-0023

3.4.3 Business Inspection Program

The goal of the Business Inspection Program is to reduce storm water pollution by encouraging businesses to implement appropriate best management practices in accordance with the City's Stormwater, Grading and Drainage Control Code. Businesses with standard industrial codes (SIC) that match Ecology's list of SIC codes are inspected within a geographical region chosen by the City. All businesses are required to maintain onsite drainage control systems and identify and remove illicit connections to the public storm drain system. Further, Inspectors use a list of HRPGA (high-risk pollution generating activities) to assist in determining businesses that require additional operational source control requirements. All businesses that engage in one or more HRPGA's are required to implement operational source controls and implement spill prevention plans. A list of the HRPGA's and summary of their specific operational requirements follows:

Table 2. High Risk Pollution Generating Activities

High Risk Pollution Generating Activity	Operational Requirements
Fueling Operations	Develop and implement an emergency spill prevention plan. Post instructions for safe operation of dispensing equipment. Ensure that spills are reported to proper authorities.
Vehicle, Equipment, and Building Washing and Cleaning Operations	Wash vehicles at a commercial facility designed to capture and properly discharge wash water. No discharge of wash water to storm drain system.
Truck or Rail Loading and Unloading of Liquid and Solid Materials	Develop written procedures for transfer operations. Develop and implement an emergency spill prevention plan. Have a trained employee present during fueling operations. Equip pumps with shutoff valves and label as such. Store and maintain spill containment materials.
Liquid Storage in Aboveground Stationary Tanks	Check fittings daily for leaks and spills. Maintain containment system. Store and maintain spill containment materials.
Outside Portable Container Storage of Liquids, Food Wastes, or Dangerous Wastes	Store materials inside proper containers. Dispose of waste regularly and properly. Check for leaks and spills regularly. Have spill prevention and clean up materials on site.
Outside Storage of Non-containerized Materials, By-products or finished products	Cover storage area to prevent contact with rainwater. Sweep paved areas. Temporarily cover storm drains to prevent erodable material from entering.
Outside Manufacturing Activity	Isolate activity and cover to avoid contact with rainwater. Regularly sweep and maintain areas. Have spill prevention and clean up materials on site.
Landscape Construction and Maintenance	Comply with applicable temporary erosion and sediment controls. Properly apply pesticides and fertilizers. Properly dispose of leaves, grass clippings, etc.

For the year 2002, inspections were conducted in the Densmore, South Park, Thornton and Pipers drainage basins. There were a total of 426 full onsite inspections. Of those, roughly 200 required corrective action. There were 748 screening inspections done. During screening inspections, Inspectors survey site activities but determine a full inspection is not necessary.

The types of problems found during 2002 and their frequency are listed in Table 3.

Table 3. Types of Problems Identified during Inspections

Type of problem	Number
Catch basin needs cleaning	125
Illicit connection	3
Vehicle washing	54
Parking lot washing	19
Automobile-related fluid in catch basin	8
Liquid storage area uncovered	14
Liquid storage area in unsafe location	24
Outside vehicle maintenance	28
Solid waste dumpster	26
Unkempt restaurant grease barrel	1
Missing trap on catch basin	21
No spill plan	154
No spill kit/material onsite	135

For the period January - June 30, 2003, there have been a total of 217 inspections conducted, including 173 full inspections and 44 screening inspections. Corrective action was required at 86 of the sites thus far. These areas include the Thornton, South Park and Diagonal basins. The Diagonal inspections are a sub basin of the lower Duwamish area and are being conducted in support of the Superfund investigation, to curtail active pollution sources before cleanup occurs.

An access database is being developed to aid in tracking of the business inspection program progress. There are currently about 2 FTEs assigned to business inspections. An additional inspector will be hired in 2003 to help with Duwamish area inspections.

Ellen Stewart (206) 615-0023

3.4.4 Drainage System Inspection Program

In 2002, 538 drainage system inspections were completed, and 259 inspections have been completed during the first 6 months of 2003. A summary of the types of facilities inspected in 2002 is presented in the table below:

Table 4. Types of Drainage Facilities Inspected in 2002

Facility Type	2002
Apartment/Condo/Townhome	244
Church	10
Commercial	254
Parking Lot	9
Public Facility (Parks, City Light)	7
School	14

Of the 538 sites inspected in 2002, 175 were out of compliance with City Code and in need of some level of maintenance or repair. Technical assistance is provided to property owners when they are informed of compliance needs. Removal of sediment from flow control structures and/or onsite catch basins, was the most common maintenance need. Other common compliance issues include catch basins missing outlet traps, and missing, broken, or plugged

flow control devices. Through the Drainage System Inspection Program, 8 illicit connections were identified and corrected in 2002.

Inspections focus primarily on multi-family dwellings, commercial, and industrial properties. The initial canvass of the city has been completed and a second round is nearly complete. A system for capturing new systems as they are built has been developed, and is undergoing refinement as the program evolves. As the plans for these new sites with stormwater detention and treatment become available, they are inspected. The total number of privately owned systems in Seattle is estimated to be 3,250 (+/- 200).

Most detention systems in the City are quite old. Regular cleaning of orifices is not as critical for proper operation of these older facilities. In the future, more effort will be focused on the business inspection program and less on drainage system inspection. After the second round of city-wide drainage system inspections, the team hopes to develop an inspection frequency for different types of sites. For instance, many commercial sites did not need to be cleaned when re-visited after 3 years. Such sites could be put on a 5-6 year inspection frequency, freeing time for other pollution control activities.

Ellen Stewart (206) 615-0023, Louise Kulzer (206) 733-9162

3.4.5 Pollution Prevention Direction-finding

In 2003, the Surface Water Quality team expects to conduct a pilot source tracing program to better target businesses and other land uses or activities that generate pollutants of concern. Currently the team relies almost exclusively on SIC code to direct business inspections. Sampling of sediments from storm drains could provide additional information on the location of current sources or the existence of past sources that might still be contributing pollutants. Locations being considered for the pilot source tracing effort include the Thornton basin and the Diagonal basin of the Duwamish. The team is currently conducting business inspections in both basins.

Louise Kulzer (206) 733-9162

3.4.6 Lower Duwamish Waterway Source Control Program

In 2003, Seattle and King County initiated a joint business inspection program to support the Lower Duwamish Waterway source control program. The Lower Duwamish Waterway was listed as a federal Superfund site in 2001 because of contaminated waterway sediments. SPU and King County are working with businesses in the area to reduce the amount of pollutants currently discharged to the waterway via storm drains and combined sewer overflows (CSOs). The purpose of the source control program is to minimize the potential for sediments to recontaminate following cleanup. The inspection efforts are focusing on areas that have been identified as high priorities for cleanup based on the results of human health and ecological risk assessments.

The inspection program began in April 2003 in the Diagonal Ave S CSO/SD basin, a 2,600-acre drainage basin that also receives overflows from both the King County interceptor system and the local SPU sewer system. As of June 2003, inspectors from SPU, King County Hazardous Waste, King County Industrial Waste, and King County Public Health have inspected about 250 businesses in the Diagonal basin. Inspections are comprehensive, covering stormwater pollution prevention, hazardous waste management, and industrial waste disposal issues. SPU and King County inspection efforts in the Duwamish area will continue in 2004 and likely beyond

to support the Lower Duwamish Waterway source control program.

Beth Schmoyer (206) 386-1199 & Tanya Treat (206) 615-1636.

3.5 STORMWATER POLLUTION PREVENTION

3.5.1 Household Hazardous Waste Program

The Household Hazardous Waste (HHW) Education program is a multi-faceted approach to educating the public, including the under-served community, about the proper use, storage and disposal of hazardous household products and about the availability of less toxic alternatives. SPU provides staffing to coordinate HHW education and collection programs as part of the LHWMP, to represent SPU on interagency committees and workgroups, and to help develop strategic policy, planning and budget proposals in support of SPU and LHWMP goals. Among the accomplishments during 2002:

- Successfully negotiated continued funding through 2004 of three SPU initiatives - the ReUse Store, the Natural Lawncare Hotline, and an Environmental Health Justice Needs Assessment.
- Co-led the HHW Education Strong Cleaners subcommittee on revising the messaging and information on the use, storage and disposal of household cleaners, resulting in the revision of the Green Cleaning Kit.
- Initiated a partnership between the Natural Yardcare Neighborhoods project and SPU's Urban Creek Stewardship program resulting in two workshop series in creek neighborhoods.

Kathy Minsch (206) 615-1441

3.5.2 Green Home Kit Program

This program produces and distributes Green Cleaning Kits and Green Cleaning information primarily in the form of Green Cleaning Recipe Cards. In addition, the program conducts New Parent Workshops that use these kits to help established parent training groups that learn about a broad range of hazardous household chemicals and healthful alternatives to these chemicals. In most cases, recipients of the kits are directed to use them as a means to begin an educational process about hazardous household chemicals that encompasses the more dangerous groups of cleaners. Among the accomplishments in 2002:

- Produced and distributed more than 2000 Green Cleaning Kits to support LHWMP program activities.
- Produced and distributed more than 15,000 Green Cleaning Recipe Cards.
- Changed name of program from Green Cleaning to Green Home Kit program.

For January through June 2003:

- Adopted a new program approach in 2003, based on the recommendations of an interagency subcommittee of the Local Hazardous Waste Management Program. The purpose is to

better educate consumers about how to choose safer cleaners.

- The recipe card was replaced with a resource card that gives tips on safer cleaners and cleaning approaches. Changes to the kit include elimination of baking soda and vinegar from the kit and replacing them with Bon Ami and one of seven all purpose cleaners.
- Distributed 1100 Green Home Kits. A phone survey will be conducted in the fall to get feedback.

Michael Davis (206) 615-1376

3.5.3 The Eco-Home

The Eco Home is a collaboration between Seattle Public Utilities, Seattle City Light, Seattle Tilth, the International District Housing Alliance (IDHA), and King County DNR. The purpose of this exhibit is to educate festival attendees using hands on activities what they can do in their home, yard, garden and community to protect the health of their family and the environment, and save money. Agency staff and trained community volunteers were on hand to engage the public and answer questions. Among the accomplishments in 2002:

- Eco Home display at 2 community events, ID Street Fair and Central Area Community Festival.
- With the help of IDHA staff and community volunteers who spoke Chinese, Vietnamese, Thai and Cambodian, we were able to dramatically increase our outreach efforts with non/limited English speaking festival attendees.

Michael Davis (206) 615-1376

3.5.4 Storm Drain Stenciling/Oil Spill Program

This purpose of SPU's Storm Drain Stenciling/Oil Spill Program is to educate the general public about pollution prevention and reduce pollution in the storm system. SPU provides storm drain stenciling and oil spill kits for community and business volunteers. Among the accomplishments in 2002:

- Increased the number of storm drains stenciled by school participants to 1,467.
- Facilitated the general public stenciling 2,655 storm drains.
- Supported 65 businesses participants in the Oil Spill Program

Carlton Stinson (206) 684-7624

3.5.5 Business and Industry Recycling Venture

SPU contracts with the Business and Industry Resource Venture, a component of Greater Seattle Chamber of Commerce, to increase business awareness and compliance with current stormwater codes. The Resource Venture provides free information, education and technical assistance to help Seattle businesses improve all conservation practices. Their stormwater assistance, provided by ECOSS (The Environmental Coalition of South Seattle) focuses on informing businesses about current stormwater codes and providing assistance in specific situations for businesses needing non-standard approaches to reduce pollution risk. The

Resource Venture and ECOSS reach businesses through newsletters, trade publications, community presentations, workshops and phone and web resources. Highlights of 2002 included a South Park workshop co-sponsored by BIRV and SPU and workshops with the Oil Heat Institute and Autobody Craftsman Association, to name a few. In 2003, ECOSS has worked closely with SPU's Surface Water Quality team to raise awareness among businesses around Lake Union, going door to door with education and awareness messages.

Ellen Stewart (206)615-0023

3.5.6 Hazardous Material Inventory

Every year for the past three years, SPU has conducted an inventory of hazardous materials used at SPU facilities. The scope of the 2001 inventory was expanded to include downtown buildings and office spaces as well as field facilities. Inventory information was entered into a database and the information made available on the City's internal web site. The 2002 inventory is complete and has been posted to the web site. The 2003 inventory is in progress and will be posted to the web site in the near future. These inventories form the basis for better management of hazardous materials stocks on hand and for the elimination of unused, outdated, or surplus chemicals that otherwise could end up in the environment (see below).

John Labadie (206) 684-8311

3.5.7 Hazardous Material Reduction

SPU continually facilitates the roundup and exchange of excess hazardous products from SPU shops and facilities. This waste reduction strategy along with improved facility practices and green purchasing has resulted in great savings in disposal costs (these products if not used-up would become hazardous wastes), reduced new product purchase costs, improved facility compliance and decreased regulatory scrutiny. These products are first offered to various City Departments for re-use, and later offered to other users through the King County Local Hazardous Waste Management Program's Industrial Materials Exchange (IMEX).

Shab Zand (206) 233-5172

3.5.8 Natural Lawn and Garden Care Campaign/Natural Soil Building

In 2002 the Natural Lawn and Garden Care Campaign continued with distribution of the "Naturals" brochures to nurseries and community events throughout King County. Over 100,000 brochures were distributed to area nurseries, the Northwest Flower & Garden Show, and other event and organizational requests. In order to further the goals of the campaign, the Natural Lawn & Garden Hotline added a second operator position and became a King County-wide service. The second operator is focused on pesticide-reduction questions. In 2002 there were over 2,000 pesticide reduction-related questions answered by Hotline staff. Overall, the Hotline answered over 9,000 questions related to environment-friendly yard care. About 900 people participated in workshops, meetings and speaking engagements on natural yard care.

Also in 2002 the Mower For Less incentives promotion was expanded to become Northwest Natural Yard Days. The program transitioned to a broader range of environmentally-sound products, including electric mulching mowers, push mowers, organic fertilizer, insecticidal soap (alternative to pesticide), hand weeding tools, water timers, soaker hoses and compost. The program also transitioned from agency-coordinated sale dates to a full month of retail sales in 30 retail locations, kicked off by a one-day sale event. 50,974 products were sold through

Northwest Natural Yard Days in 2002.

The Natural Soil Building Program continued with compost bin sales of over 1,700 in 2002, as well as continuing the Chip and Mulch Tour Pilot (free woody waste chipping for groups of neighbors in Seattle). The Industry Soils Collaboration, the networking effort with landscape professionals, held one meeting with landscape professionals and sponsored a free soil improvement seminar, also targeted to landscape professionals and horticulture students.

In the first half of 2003 SPU began a new project, the Natural Yard Care Neighborhood outreach. Two neighborhoods adjacent to creek drainages were chosen for intensive recruitment. A series of six classes over 3 evenings were presented in each neighborhood. 117 residents attended one or more evenings as part of this effort. Door prizes were awarded, and participants gave very high ratings to all the workshop presenters. A fourth evening is being planned in each neighborhood for October, 2003.

SPU continued distribution of the "Naturals" brochures through area nurseries. The Natural Lawn & Garden Hotline expanded the number of incoming calls and call responses. Northwest Natural Yard Days became a retail-only program. The Chip & Mulch Tour Pilot was discontinued due to high administrative costs.

Carl Woestwin (206) 684-4684

3.5.9 Green Gardening Program

The Green Gardening Program continues to be implemented by the consultant team of Seattle Tilth Association, Washington Toxics Coalition and Washington State University Cooperative Extension. The program has been managed by SPU and funded by the Local Hazardous Waste Management Program (LHWMP) since 1993, with the goal of educating King County residents and landscape professionals about alternative pest management strategies in an effort to reduce pesticide use. Among the accomplishments in 2002:

- 821 people attended 39 Green Gardening presentations. The WSU Food Garden Project presented 16 classes on organic gardening to 116 low-income people, mostly non-native speakers.
- Six *Practical Gardener* columns on Green Gardening topics ran in the Sunday Seattle Times, including columns on mulch and its uses, growing vegetables without pesticides, beneficial insects and fall soil care.
- 107 Master Gardeners received 3 hours of Green Gardening training; 25 Master Gardeners were trained in presenting Green Gardening slide shows.
- 194 nursery staff plus 74 community college students attended Green Gardening presentations.
- 299 professional groundskeepers (and some agency program staff) attended the annual Integrate Pest Management (IPM) Workshop for Groundskeepers. A total of 150 participants signed up for recertification credit for their pesticide applicator's license. About 70% of those attending are staff to a government agency or a university/college.
- Two successful Creekside Living Workshops were presented to a total of 80 participants in the Longfellow Creek and Pipers Creek watersheds.

- Consultation and bioassay assistance were provided for gardeners at community gardens who were concerned about clopyralid contamination issues. Samples of hay, straw and soil were given bioassay tests, and 14 samples, mostly horse manure, were tested at a commercial laboratory.
- All aspects of the Green Gardening Program were evaluated. An extension of last year's longitudinal study identified reported behavior changes among selected participants at Green Gardening slide shows, with better statistical accuracy than last year.

Carl Woestwin (206) 684-4684

3.5.10 Pesticide Reduction

Seattle's Pesticide Reduction Program is an outgrowth of the Seattle Environmental Management Program (EMP), which was adopted to promote environmental stewardship in City operations. The EMP Chemical Use Policy establishes a framework for evaluating potentially hazardous materials and prioritizing products for phase out and replacement with less hazardous alternatives. Pesticides were the first product group addressed under the policy because they are potentially hazardous chemicals intentionally placed directly into the environment. The two main goals of the Pesticide Reduction Program are (1) to eliminate the use of the most potentially hazardous herbicides and insecticides and (2) to achieve a 30 percent reduction in overall pesticide use. Employee-driven innovations have resulted in eliminating use of most Tier 1 insecticides and herbicides and significantly reducing overall pesticide use. Figure 2 is provided below for information on the progress of the program. The chart shows the estimated reduction in pesticide use for 2000 - 2002 against a baseline developed using average annual pesticide use between 1995-1999. Additional information on Seattle's Pesticide Reduction Program is available at <http://seattle.gov/environment/pesticides.htm>.

Tracy Dieckhoner (206) 386-4595

3.5.11 Pesticide Free Parks

In a joint project involving Seattle Parks and Recreation and the Office of Sustainability and Environment, Seattle has designated six major and eight minor park locations as Pesticide-Free Parks. These locations will be maintained without the use of pesticides, providing City staff with the opportunity to better understand options for caring for lands with less reliance on pesticides *and* providing the community the opportunity to enjoy parks maintained without pesticides. The six featured pesticide-free parks are: TT Minor Playground, Webster Playground, Meridian Playground, Fairmont Playfield, Bradner Gardens Park, and Beer Sheva Park. Additional information is available at <http://seattle.gov/environment/pesticides.htm>.

Barb Decaro (206) 615-1660 or Tracy Dieckhoner (206) 386-4595

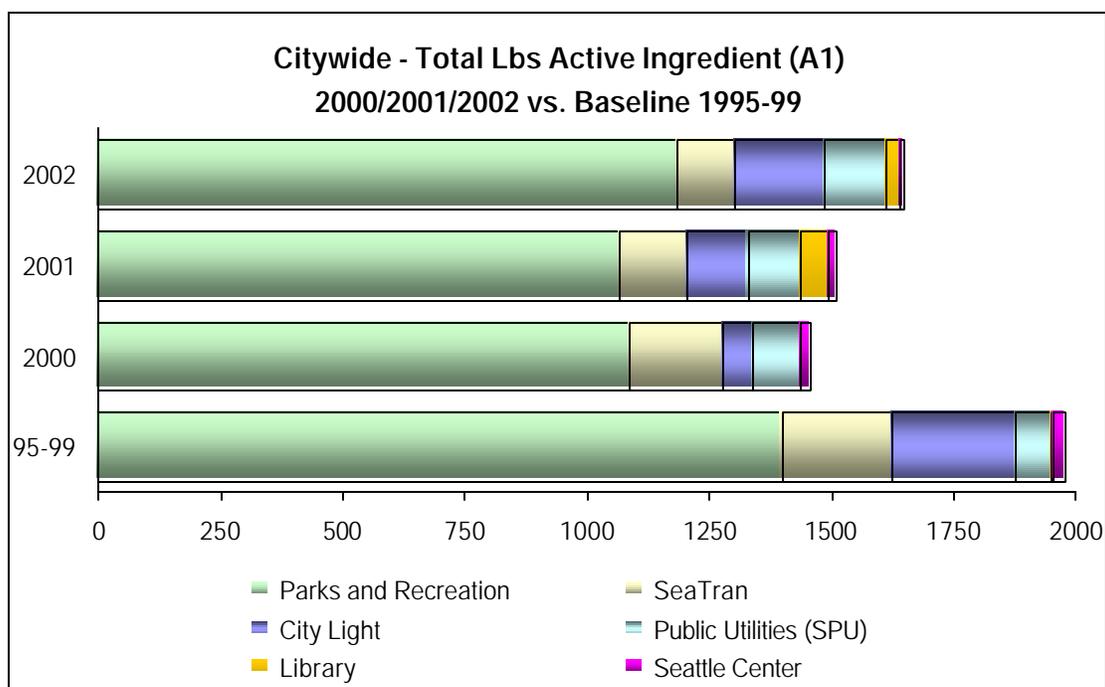


Figure 2. Citywide Pesticide Use
Total Pounds Active Ingredient (A1), 2000/2001/2002 vs. Baseline Avg. (1995-1999)

3.6 ILLICIT DISCHARGES

In addition to the programs described below, investigation of illicit discharges and improper disposal of materials to surface water are also incorporated into a number of programs described elsewhere in this report, including Water Quality Complaints (Section 3.4.2), Business Inspection Program (Section 3.4.3) and TV inspections performed on storm sewers (See 3.8 Operations & Maintenance of Drainage System).

3.6.1 SPU Spill Coordinator/Response Program

In 1998, SPU implemented a Spill Coordinator Program to respond to hazardous material spills occurring in the Seattle service area. The role of the Spill Coordinator is to lead SPU response activities, including: evaluating hazardous substance spills, deciding how best to mitigate and clean up the spill, mobilizing and committing SPU resources, and overseeing the activities of a spill response contractor, if needed. A Spill Coordinator is available 24-hours a day, including weekends, on a rotating 1-week duty schedule. At present, the network consists of 11 Spill Coordinators trained to the Hazardous Materials Emergency Response Technician level. The accompanying matrix shows the spill response experience from 1998-2002:

	1998-99	2000	2001	2002
# of Spills	44	42	70	75
SSC response	20	28	60	57
Non-duty hour	N/A	12	9	30

John Labadie (206) 684-8311

3.6.2 Illegal Dumping

SPU has developed a number of programs to respond to litter and illegal dumping activities in the city and to ensure the efficient collection of litter in public places. The objectives of these programs are to reduce or prevent litter activities, enforce city ordinances, facilitate community cleanup. An effective illegal dumping program reduces pollution being washed from our streets and alleys into the storm drains and receiving waters. Among the accomplishments in 2002:

- Resolved over 3000 cases, of which more than 2800 were reported over the Illegal Dumping Hotline (206-684-7587).
- Provided for the pickup, collection and removal of 2,200,000 pounds¹ of illegally dumped materials on City streets, roads, and public areas.

Over the first six months of 2003, SPU has resolved over 1500 cases (January – June) of which more than 1300 were reported over the Hotline.

Alex Tonel (206) 684-4170

3.7 PUBLIC INVOLVEMENT, EDUCATION, STEWARDSHIP

3.7.1 Citizen Advisory Committee

Seattle Public Utilities sponsors several Citizen Advisory Committees. The advisory committee most involved with stormwater-related issues is the Creeks, Drainage and Wastewater Advisory Committee (CDWAC). This committee sets its own work plan and operating procedures with input from staff. Decision-makers within SPU are regularly briefed on committee actions and input, and emphasis is placed department-wide on responding promptly to committee recommendations. The membership of this committee includes citizens with professional background in the subject area and representatives of relevant stakeholder groups to provide a diversity of viewpoints. This committee meets on the second Wednesday of each month.

Carlton Stinson (206) 684-7624

3.7.2 Environmental Education Team

The Environmental Education Team works with both public and private partners to provide an integrated program provide a range of environmental messages encompassing solid waste, hazardous waste, recycling, water quality/drainage, and water conservation. SPU supports students through curriculum assistance and field trips that connect students with the environment outside the classroom. Among the Team's accomplishments during 2002 and early 2003:

- Continued working with Seattle School District for integrated environmental programs for

¹ The amount of illegally dumped materials may not include litter detail, which is not measured the same as illegally dumped materials. Depending on crew and vehicle availability, clean up may involve more or less frequent litter detail versus illegal dumping as a measure of tonnage.

4th and 5th grades.

- Continued working with Metro-Center Earth Service Club to provide support in 9 of 10 Seattle High Schools.
- Conducted four in-house staff cross-training sessions to get all staff up to speed on all our environmental messages.
- Continued aligning Salmon in School and water education offering with school district and State curriculum standards.
- Funded Professional Development for teachers for integrating SPU messages in classroom presentation and academic curriculum.
- Partnered with Cedar River Environmental Education Center staff to ensure coordinated service delivery efforts.
- Conducted and completed several teacher focus group sessions.
- Contracted with Thornton Creek Project to deliver service to youth and support curriculum enhancements with Seattle teachers and staff.
- Continued agreement with Pacific Science Center, Mercer Slough Grant to support watershed internship with high school students in southeast Seattle.

Anthony Matlock (206) 386-9746

3.7.3 Salmon in the Schools

The Salmon in the Schools program gives students hands-on activities and field trips to enhance current environmental curriculum taught by Seattle teachers. Raising salmon in the classroom helps get students become interested and involved in their watershed and provides an opportunity to learn what they can do to protect the environment. Additionally, this program provides two field trips that are organized around the classroom project. The first field trip is to the University of Washington Fish Hatchery in the Fall, and second is to their local watershed in the Spring where they plant their salmon fingerlings into their local stream. Among the accomplishments in 2002:

- Program completed its 12th year.
- 78 Seattle schools participate in the program.
- Program serves 4th and 5th grades, with links to the Seattle School District's academic programs.
- Program touches about 30,000 students, some directly and some by tank observation, as the tanks are placed in common areas in each school.
- Students plant over 20,000 salmon fry into local streams.
- 85% of teachers surveyed rated it among the top programs.

Carlton Stinson (206) 684-7624

3.7.4 Environmental Grant Funding

The Environmental Grant program provides funding support for community groups or schools to

do one-time, short-term projects that protect, educate and involve communities in educating and protecting our natural resources, with respect to water quality, solid waste, and litter and graffiti. During 2002 SPU funded three different levels of projects related to water quality. SPU partnered with Seattle Public Schools for \$82K to provide every fifth grade student (3000) science kits and field trips to teach students about water quality. The program uses a salmon-rearing aquariums curriculum prepared by science resource teachers from the district. Each class visits a local urban watershed to apply and observe the effects of urban sprawl in their environment. The focus is erosion, non-point pollution and habitat restoration. The project included funding to train all fifth grade teachers in water quality messages. We also gave Metro-Center YMCA \$18k to support Earth Service Corps clubs in each of the city's ten high schools. Projects included creek work parties and natural landscaping on school grounds. The second level was \$5K each to three neighborhood groups to replace impervious surfaces with natural landscaping. The third level was \$1K each to three community groups for volunteer replanting projects in creek watersheds.

Anthony Matlock (206) 386-9746

3.7.5 Urban Creeks and Watershed Stewardship Team

The Watershed Community Stewardship program consists of several approaches towards educating and involving Seattle's communities in stewardship of their local urban creek watersheds in order to help the city maintain, restore and protect them. The Urban Creek Stewardship program is oriented towards engaging the community in volunteer creek steward projects and educating them on the value of creek ecosystems and the impacts of human activities. Watershed educators implement programs from the Pipers Creek and Longfellow Creek watershed action plans with input from community-based watershed councils and groups. SPU contracts with the Thornton Creek Project to conduct watershed education in the Thornton Creek watershed to implement the draft Thornton Creek Watershed Action Plan and new Action Agenda developed in 2003. SPU also supports implementation of the community-generated watershed plan and council in the Fautleroy Creek watershed. A few highlights from 2002 and the first half of 2003 include:

- Created expanded creek-friendly gardening workshop series through negotiation of increased funding from Local Hazardous Waste Management Program (LHWMP) and development of new partnerships with Parks and King County. Included funding demonstration gardens at Delridge Community Center and Phinney Ridge as part of the Longfellow and Living Green in Pipers Creek Watershed workshops.
- Developed new work program for 2003 Thornton Creek Project grant and reconvened the Thornton Creek Watershed Committee starting January 2003 to advise on development and implementation of the Thornton Creek Action Agenda.
- Improved internal coordination and communication with staff and management in Resource Planning, Operations and Maintenance, Communications, and Engineering on issues involving creek stewardship.

Kathy Minsch (206) 615-1441

Creek Steward Program

The Creek Steward Program provides opportunities to learn about our creek systems and get involved in sustaining Seattle's urban creeks. Through partnerships with Seattle Parks and

Recreation (SPR) and other agencies, local community groups, businesses, schools and individuals, the Creek Steward program restores riparian vegetation, maintains existing plantings, monitors creeks and salmon, and educates citizens in best management practices to benefit our urban creeks. Among the 2002 accomplishments:

- Recruited and trained 31 Site Stewards in five watersheds who invested 500 hours. Site Stewards provide long-term care and maintenance for established public sites along Seattle creeks. In 2003 46 Site Stewards logged over 250 hours of volunteer time.
- Supported over 600 volunteers participating in Creek Steward invasive removal and native planting events. In 2003 conducted 24 work parties with over 350 volunteers.
- Piloted Backyard Steward program in 2002. Visited ten citizen backyards (both streamside and greater watershed). Formulated standards for steward requirements in line with DCLU regulations.
- Partnered with Port of Seattle, King County Dept of Natural Resources & Parks, and SPU Salmon Team to run a volunteer event at T107 on the Duwamish River. 44 volunteers, including Congressman Jim McDermott, planted over 100 trees and removed a dumpster full of trash from the intertidal beach.
- At Meadowbrook Pond presented two tours to University of Washington Landscape Architect and Environmental program participants, conducted two large weed removal events with Washington Mutual and Starbucks employees, held a beaver workshop in 2003, and worked with Nathan Hale High School's horticulture program. Site Steward regularly maintains Pond, including removing trash and invasive weeds.
- Established new business volunteer partners including Starbucks, Washington Mutual Bank, CDM Consulting and Microsoft. 100 Microsoft and Washington Mutual employees removed invasive weeds at Thornton and Longfellow.
- Trained 12 new volunteer Creek Steward Team Leaders in volunteer coordination, watershed and stream concepts, plant identification, planting, and weed removal. (Partnered with King County, incorporated cities of Redmond, Woodinville, Bothell).
- Continued volunteer macroinvertebrate monitoring with SPU monitoring staff.
- Conducted two Creek Friendly Gardening Workshops, one in Longfellow Creek watershed (in partnership with Community Watershed Stewardship Staff and DPR's stewardship coordinator) and one in Pipers Creek. Forty attendees learned to reduce lawn area by installing demonstration gardens at two community centers.
- Conducted two "Naturescaping" workshops with King County Department of Natural Resources and Parks. Over 120 attendees participated at workshops and at homeowner salvage event (where they dug up plants for their own landscaping).
- Provided training in Macroinvertebrate (streambug) Monitoring – volunteers then sampled in Longfellow and Taylor Creeks
- Provided two Salmon Watcher Training sessions (one large multi-jurisdictional, one for Fautleroy Stewards).

Longfellow Creek Watershed Project

The Longfellow Creek Watershed Action Plan and SPU's Creek Stewardship and Education Teams currently guide the work of the Watershed Specialist. The Plan outlines commitments made by cross-jurisdictional partners, including SPU, Seattle Parks and Recreation, other City and County agencies, community groups and Neighborhood Councils. This work includes evaluating citizens in the watershed about ways to improve water quality.

- Planned and implemented educational component for Chief Sealth High School Chinese exchange program (partnered with West Seattle Rotary, Sister Cities, Sealth staff)
- Facilitated Parks / SSD/ SPU work for Land and Water and SPU message integration with Salmon in the Schools field trips (resulted in improved communication, coordination, and positive changes in programs and partnership).
- For the Longfellow Creek Legacy Trail: facilitated formation of Citywide Interdepartmental Team (IDT) to assist in review, coordination, problem solving, and collaborative efforts for the project; served on Steering Committee to ensure on-going communication, coordination, support, and partnership between community and City; and participated in outreach, planning, and facilitation of chartered/ public meeting for Sealth site on design ideas and stewardship opportunities.
- Initiated and developed Delridge Library partnership and commitment for collaboration on activities for 10th anniversary of Longfellow Creek Watershed Action plan (LCWAP) and watershed awareness for a variety of audiences.
- Collected historical ecological information about the creek through interviews with 25 community members in cooperation with Washington Trout. Report produced in 2003.
- 100 Washington Mutual Volunteers worked at Longfellow creek sites for their company service-day.
- Created and published an information brochure and map on the watershed and trail
- Organized and staffed monthly Our Lady of Guadeloupe 6th grade Stewardship project at Greg Davis Park including native planting and watershed education.
- Facilitated Watershed Council restructuring to include members of community stewardship groups for better representation (Legacy Trail, Roxhill Greg Davis Park) and completed development of the watershed council's mission statement.
- Completed Power Point presentation and rollout plan. Presented to community organizations - Delridge District Council, West Seattle Human Services Coalition, and West Seattle Rotary (03).

Sheryl Shapiro (206) 233-2046

Pipers Creek Watershed Project

The Pipers Creek Watershed Action Plan for the Control of Nonpoint Source Pollution (1990) outlined a series of recommendations, which included providing a Watershed Interpretive Specialist to help develop and coordinate community outreach on watersheds and to improve water quality. A review of the Plan was completed in 2000 that outlined new recommendations to further meet the goals of the Watershed Action Plan. Among the accomplishments in 2002:

2002 Update Report

- Students from more than 21 schools participated in 1.5 to 2 hour-long naturalist programs at Carkeek Park. Programs focused on habitat and clean water, and included activities on the wetlands and salmon return.
- 45 Salmon and Wetland Stewards received training on a variety of topics related to wetlands and watersheds in Carkeek Park. Along with other volunteers, stewards volunteered over 6,625 hours on public education and stewardship projects at around Carkeek Park. Eleven Creek Stewards adopted sites along Pipers Creek in 2002.
- The 2002 Pipers Creek Salmon Return Celebration on November 29th was attended by between 250 and 300 citizens.
- 130 people attended programs on watershed friendly gardening and home remodeling through a Public Involvement and Environment (PIE) Fund contract from the Puget Sound Water Quality Action Team. The Program, "Living Green in Pipers Creek" was awarded to the Carkeek Environmental Education Center.
- The Pipers Creek salmon supplementation program was reviewed by the Hatchery Scientific Review Group (Puget Sound and Coastal Hatchery reform group. The program was hailed as "providing educational benefit" and "a good example of an educational program."

In May, 2002, the new Carkeek environmental Learning Center was dedicated. The Center features a variety of sustainable design elements and is proposed for a gold LEED rating.

Beth Miller (206) 684-0877

Taylor Creek and Deadhorse Canyon

Located in Southeast Seattle, Taylor Creek is a small creek that flows from the Skyway District of King County and into Lake Washington at 68th Avenue South. Most of the reach that flows through Seattle proper is within Lakeridge Park and has formed Deadhorse Canyon. Though greatly improved over past years, the area continues to suffer from an infestation of invasive weeds. Volunteers have been trained to recognize invasive weeds and in proper planting techniques for native species. As part of the broader Creek Stewardship Program, the Taylor Creek Stewardship effort provides support to residents concerned with improving the natural habitat of the entire Taylor Creek watershed in general and the Dead Horse Canyon area specifically. Such support includes, but is not limited to, tools and supplies (e.g., bags and tarps), northwest native plants, volunteer recruitment, refreshments, and logistical support.

- Supported 12 regularly scheduled monthly work parties (over 1000 volunteer hours).
- Coordinated and supported 14 special work parties (over 1800 volunteer hours).
- Supported High School internship program, which trains students to teach elementary school level basic watershed sciences.
- Removed over 50 cubic yards (conservative estimate) of invasive weeds.
- Planted over 1500 plants, including 500 trees.
- Laid down 10+ yards of mulch over heavily impacted areas.

- Expanded the volunteer base of "Friends of Dead Horse Canyon."

Tom Gannon (206) 684-8565 & Bob Spencer (206) 684-4163

3.8 OPERATIONS & MAINTENANCE OF DRAINAGE SYSTEM

SPU Drainage and Wastewater Operations Division is responsible for drainage system maintenance. Table 5 and Table 6 list the different activity accomplishments.

Table 5. 2002 Quarterly Totals

Main Line Cleaning	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total lineal feet
Hydrocut	1,397	1,647	780	324	4,148
Machine Rodding	1,479	135	52	50	1,716
Jet Cleaning	4,129	5,923	2,506	904	11,085

Main Line TV Inspect	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total lineal feet
TV Line	711	3,205	4,887	8,347	17,150

Table 6. 2002 Drainage Maintenance

Activity	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
Mechanical Clean-Catch basin/Sand box	5,169	2,018	1,850	1,636	10,673
Manual Clean Inlets	8,125	5,341	3,759	4,400	21,625
Power Rodding (lineal feet)	5,758	3,185	1,606	3,736	14,285
Inspect Catch Basin/Sand Box	845	5,805	3,700	6077	16,427
Repair/Replace Drain Structure	4	74	64	58	200
Maintain Ditches (lin. feet)	118,193	67,742	45,674	30,035	261,644
Closed circuit TV Inlet/Outlet Pipes (lin. feet)	130	70	31	8	239
Clean Settling Basins/Ponds	216	5	12	7	240
Jet Cleaning (lineal feet)	601	13,373	10,989	13,354	38,317
Clean Bridge Drains	10	204	502	49	765
Hydrocut (lineal feet)	0	51	50	70	171

Pat Gorham (206) 386-9730

3.9 OPERATIONS AND MAINTENANCE OF ROADWAYS

Seattle Department of Transportation (SDOT) Street Maintenance Division has a staff of approximately 80 field and management personnel involved in street sweeping and de-icing. The City has eight sweepers that follow a schedule (weather permitting) of cleaning public streets and roads. Industrial and commercial areas are regularly swept on a rotating basis. Bike paths are cleaned approximately once a month. In addition, roadways known to receive a significant number of leaves receive repeated visits during autumn. Street cleaning crews also respond to

emergency calls, for example oil spills on the roadway, which are typically cleaned up with absorbent pads, brooms or spagnum. During winter, the City uses both sand and anti-icing and deicing products to aid traffic during freezing weather. Street sweepers are used to pick up any remaining sand after it is no longer required. In 2002, there were approximately 35,790 curb miles of streets swept. Litter control is the responsibility of the SPU Community Services Division, which coordinates a number of volunteer programs to help keep the City's roadways clean, such as Adopt-a-Street, Neighborhood Cleanup, and Spring Clean. Table 7 shows the 2002 SDOT Street Maintenance accomplishments and expenditures for drainage-related work.

Table 7. Selected 2002 expenditures for Street Maintenance

Activity	Accomplishments (Units)	2002 Expenditures
Mechanical sweeping	35,787.5 Curb Miles	\$1,275,708
Street flushing	81 Work Miles	\$6,543
Alley flushing	5,650 Alley Blocks	\$125,703
Snow & ice response	2, 970 Labor Hours	\$202,865

In 2001, the City of Seattle SDOT, SPU, and Parks & Recreation began implementing elements of Regional Road Maintenance Program National Marine Fisheries Service Section 4(d) Rule of the Endangered Species Act. In 2002, SDOT updated its standard practices to align them with best management practices in the Regional Road Maintenance Program.

Jim Dare (206) 684-5319

3.9.1 ESA Regional Roads Maintenance Program

In 2003, the City of Seattle began implementing the Regional Road Maintenance ESA Guidelines (RRMP). During this year, the City updated many of its standard operating procedures for maintenance activities in the right of way to be consistent with the RRMP. In addition, the City sent over 60 people to RRMP training courses. The City also began developing an erosion and sediment control training program that: 1) meets requirements expected in the City's next NPDES Stormwater Management Permit and in the RRMP; and 2) provides a forum for City departments to discuss the success or failure of their erosion and sediment control measures. The City hopes to consolidate elements of the RRMP and new training program into a single program.

Sandy Gurkewitz (206) 684-8574

3.10 MUNICIPAL TRAINING

3.10.1 Drainage Maintenance Crew Training – Standard Operating Procedures

In 2001, SPU initiated a program designed to address routine maintenance and repair work on drainage infrastructures located within environmentally sensitive areas. Such areas include both fish and non-fish bearing streams, plus ditches that have the potential to impact creeks. Standard Operating Procedures (SOPs) have been developed as part of this maintenance program, describing appropriate Best Management Practices (BMPs) to be included as part of the maintenance activity to protect the creek in which work was being conducted and to the resources downstream of the work area. The focus of each SOP was to avoid adversely impacting water quality, primarily by containing loose sediment and containing turbidity to inside

the isolated work area. The SOPs were developed to provide guidance and standards to drainage maintenance crews that conduct routine maintenance to the drainage infrastructure within environmentally sensitive areas on a regular basis. As of mid-2003, the program received full SEPA review and was permitted under the Washington Hydraulic Code. The program addresses the following activities:

- *Sediment Removal* - the removal of excess sediment from the drainage system including, catchbasins, culverts and deposition areas within creeks and ditches, that is creating a conveyance problem;
- *Creek Structure Maintenance* - re-anchoring, repair, removal, or replacement of creek structures (rock or boulder weirs, logs, root wads, El-wood, boulders) placed in the creek as part of a restoration project;
- *Ditch Cleaning/Reshaping* - cleaning/reshaping of ditches that have potential to impact a creek;
- *Culvert Repair* - repair of culverts located within creeks or ditches with potential to impact a creek;
- *Minor Bank Stabilization* - stabilization of stream and in-line pond banks, and the banks of ditches that have potential to impact a creek. This work only includes minor stabilization that can be considered maintenance to prevent bank sloughing or continued erosion;
- *Hydrocutting* - hydrocutting of roots, grease and miscellaneous debris within pipes located within a sensitive area or ditch with potential to impact a creek in order to provide proper conveyance;
- *Trash And Debris Management* - removal of trash and organic debris from creeks and from ditches that have potential to influence a creek;
- *On-Line Pond Maintenance* - general maintenance work within a retention/detention pond that is hydraulically connected to a creek. Work could include, but is not restricted to, sediment removal, repair or replacement of natural structures, such as LWD, repair of existing culverts, debris and trash removal, or vegetation establishment and maintenance.

Crews conducting this kind of work receive ongoing training in these SOPs.

Shanti Colwell (206) 386-1501

3.11 INFORMATION & DATA COLLECTION, MANAGEMENT & ANALYSIS

This section highlights some of the activities conducted during this reporting period the support decision making, project design, and programmatic modifications. It includes not only on-going data collection and analysis efforts, but also summarizes some of the underlying tools that support data and information management.

3.11.1 Information Support Programs

Precipitation Monitoring

Currently, there are 17 rainfall-monitoring stations located throughout the city. Raingauge 14, located in West Seattle High School at Walnut Ave. SW and SW Winthrop St. was not functioning for several months of the year 2002, owing to construction activities and having the

rain gauge removed. No major upgrades, expenditures, or maintenance were performed in 2002. Table 8 provides average monthly rainfall accumulation. The average annual rainfall accumulation in Seattle in 2002 was 26.07 inches.

Table 8. Average Monthly Accumulations in 2002 in inches

Jan	5.29	Jul	0.68
Feb	3.78	Aug	0.08
Mar	2.57	Sep	0.52
Apr	2.89	Oct	0.55
May	1.15	Nov	2.74
Jun	1.28	Dec	4.54

Hirod Gill (206) 615-0826

Surface Water Quality Database

SPU staff maintain a Microsoft Access database of all surface water quality complaint investigations, source control business inspections, monitoring and sampling data. This database is updated and backed-up weekly, and is stored indefinitely. The surface water quality database is accessible to all SPU staff.

Mike Hinson (206) 733 9134

Comprehensive Creek Inventory

Completed in early 2002, the purpose of the Comprehensive Creek Inventory was to investigate and assess the current conditions of Seattle's smaller stream systems. This study expanded documentation of these systems, field checked the GIS streams coverage, and provided the framework for developing criteria for future SPU involvement in urban streams. Stream investigations were performed through visual and photo documentation. Depending upon terrain and private/public property issues, surveys were conducted by walking the stream channel, spot checking the stream at key locations, or a combination of both techniques. Stream information was recorded on base maps created using the City's GIS system. Information on stream channel conditions, streamside vegetation, canopy cover, locations of storm drain outfalls and other utility structures were recorded. The City's stream GIS coverage was also field checked for accuracy and updated as required. Unique stream features and problem areas were documented and photographed. Once the stream had been surveyed, information was collated and transcribed onto new maps, photos were identified and labeled, and a compendium of stream information was assembled into notebooks.

Joe Starstead (206) 684-7877

GIS Support

The history of Seattle's Geographic Information System (GIS) spans nearly 20 years. Evolving from a small installation in the former Seattle Engineering Department, the City's GIS was originally built to improve the way the City manages and operates its utility infrastructure. Seattle's GIS capabilities are now firmly entrenched within the daily business functions of most City Departments. GIS data can be combined to produce a wide variety of maps and/or to perform analysis. The system is used to inform decision makers and planners, help deliver services to the public, dispatch Police and Fire personnel, and manage City real estate. The

City of Seattle's GIS base map, referred to as the Central Geographic DataBase (CGDB), consists of six GIS databases. These six base layers are the foundation for the City's geographic systems environment and are the shared layers to which all other thematic GIS layers are spatially registered. The CGDB is composed of the legal layer (lots, plots and plats), the survey control layers, Parcels, the Street Network database, Topography and the Orthophoto layer. This set of base layers is accurate to +/- 1 to 2 feet and was constructed using a combination of existing coordinate information, Global Positioning Satellite (GPS) surveys, photogrammetric densification, and calculations based on plat information and other survey data. The result is one of the most spatially accurate sets of GIS base layers in the country.

SPU's operational Drainage and Wastewater GIS contains over four million records representing all sewer and storm mainlines and service connections. It was built over a period of three years from two main information sources: the Side Sewer Cards and the original CAD-based Truck Set maps. Today's system, maintained in SPU - Information Technology in coordination with Field Operations, produces a variety of hard copy custom and standard map sets (e.g., 200-scale maps and Truck Set maps). City and Utility staff have direct access to the data through easy-to-use custom interfaces.

The primary focus for the Drainage and Wastewater GIS continues to be on data accuracy. Resources are devoted to addressing missing or errant mainline data, improving the connection to SPU Infrastructure Management System (IMS), and addressing the backlog of sewer plat changes. A tremendous number of updates and corrections have been made to the system, but the work is not yet complete. The sewer plat backlog is estimated to be eliminated by the fourth quarter of 2003, and the GIS/IMS Integrity project will have IMS and the DWW GIS linked by the third quarter of 2004. The result of these data accuracy efforts has been significant improvements to the system and its reliability.

Harvey Arnone (206) 233-0028

Ditch and Culvert Inventory

The Ditch and Culvert Inventory project represents on-going and expanded data collection, analysis, and management of the city's informal drainage system (i.e., ditch and culvert). In addition to completing the ditch/culvert inventory, other information needs have been identified that relate to flow conveyance, water quality and maintenance. In addition, other factors may guide ditch design and maintenance such as public safety, proximity to landslide areas, type of street, infiltration potential and geographic location. Work with the University of Washington has resulted in a report that outlines optimal ditch design factors and includes: (1) categorization of ditch types (e.g., "normal" ditches, those within close proximity to a creek, those near landslide-prone areas) that can be mapped on the City's GIS drainage layer; and (2) determination of what these different ditch types require in terms of design specifications. Requirements will vary based on site characteristics and objectives.

The work in process includes:

- Develop guidelines for ditch maintenance and rehabilitation on existing systems as well as for natural systems.
- Identify those existing ditches that require rehabilitation.

This work is expected to be completed by the end of 2003.

Keith Kurko (206) 233-1516

Stormwater Structural BMP Mapping

Structural BMPs have been mapped using GPS and a GIS database of these sites now exist. The mapping identifies the location and type of BMP, which also supports maintenance crews establishing maintenance schedule for the various sites. Locations of BMP facilities will be continue to be updated as they are built.

Keith Kurko (206) 233-1516

Basin & Creek GIS Delineation

Beginning in the fall of 2001, SPU began updating the creek watershed boundaries in GIS for Thornton, Taylor, Fauntleroy, Longfellow, Schmitz and Pipers creeks using new and revised ditch, culvert and topographical information. Within each of these creek watersheds, SPU has also been delineating outfall sub-basins using GIS mainline data, topography, and ditch and culvert data. The creek delineation is currently 100% complete and delineating outfall sub-basins within these watersheds is approximately 80% complete. In 2002, SPU began also annotating smaller creek basin boundaries and started delineating drainage basin boundaries for major outfalls discharging into the Duwamish River and Elliott Bay.

Scott Reese (206) 733-9172

3.11.2 Receiving Waters

Longfellow Creek Investigation

In 2003, SPU sponsored a Seattle University student project to evaluate water quality and aquatic health conditions in Longfellow Creek and to assess whether operations at the West Seattle Golf Club have had a significant impact on stream health. The study included an assessment of pesticide usage and timing, benthic invertebrate sampling, and analysis of water quality data.

Beth Schmoyer (206) 386-1199

Water Quality Basin Studies

In 2003, SPU initiated water quality investigations in the Densmore and South Park drainage basins to evaluate water quality conditions and assess the need for stormwater quality improvements. These studies are being conducted to augment hydrologic/hydraulic studies that were recently completed in these 2 basins. For the Densmore basin, the analysis is focusing on evaluating potential water quality impacts on Green Lake from proposed drainage system improvements and identifying opportunities to incorporate stormwater treatment into both the trunkline and local drainage systems. For the South Park basin, the analysis is focusing on potential stormwater and sediment quality issues associated with a stormwater pump station that is being considered to reduce local flooding problems.

Beth Schmoyer (206) 386-1199.

Urban Creeks Watershed Analysis

The Urban Creeks Watershed Analysis is a study assessing the condition of six watersheds in the City of Seattle – Thornton, Pipers, Longfellow, Taylor, Fauntleroy, and Schmitz creeks. The

purpose of the study is to provide a technical information base for decision-makers' planning projects and programs that affect fish and habitat in Seattle's creeks. The study assesses fish use in each system, including existing and potential distribution, passage for migration, changes in the annual distribution of spawning activity and of juvenile production. An analysis of physical data is currently underway to help develop an understanding of how watershed processes affect the availability and condition of habitat in each system. Physical data include: habitat quality, channel conditions, riparian conditions, geology, and land uses. Field inventories are completed, and the data are being transferred to the City of Seattle's Geographic Information System (GIS).

Katherine Lynch (206) 233-5194

Aquatic Community Assessment Program

The aquatic community assessment program is in its tenth year. SPU continues to use regionally developed sampling protocol, converting the raw data into the regionally accepted Benthic Index of Biotic Integrity (B-IBI). A comprehensive analysis of the existing benthic macroinvertebrate data by an environmental statistician was completed in September 2002. The report concluded that in general, Seattle's urban streams suffer from low abundance, a high number of tolerant individuals, and low diversity in aquatic invertebrates. Many factors could be responsible for this conclusion, including the fact that some stream are fairly low-gradient and do not have the well-developed riffle areas that benthic invertebrates prefer. Based on the results of the recent analysis, the schedule for monitoring the benthos stations was shifted from sampling every year to sampling every two years. In 2002, eight Seattle creek sites were sampled: Longfellow, Mapes, Washington, Schmitz, Taylor, and Fauntleroy. Benthic macro-invertebrates were collected at these sites by volunteers. In April 2003, when the sampling results came back from the lab, the volunteer monitors were invited back for an analysis workshop. A problem that has emerged in the analysis of aquatic macroinvertebrates in degraded urban environments is the low overall number of individuals, which decreases the confidence level that the BIBI metric is adequately capturing the distribution of the aquatic community. Based on the advice of a biometric statistician, the method to be used to increase confidence levels will be to triple the area sampled in 2003.

Laura Reed (206) 615-0551

Storm Event Sampling

A storm event is defined as a storm that lasts for a minimum of 4 hours and contributes at least 0.1 inches of rain with an antecedent dry period (less than 0.01 inches of rain) of at least 8 hours. Storm event samples (flow-weighted composite samples) are collected at the following four locations:

- Pipers Creek basin:
- Venema Creek at the mouth
- Pipers Creek at footbridge downstream of Venema Creek
- Pipers Creek above orchard
- Longfellow Creek at Yancy Street

For the period January 2002 through June 2003, storm samples were collected at the 3 Pipers Creek stations on the following dates:

- October 3, 2002
- November 6, 2002

December 12, 2002

During the same period, samples were collected during the following two storm events at the Longfellow Creek station:

November 6, 2002
December 10, 2002

Analytical reports from these and previous storm sampling events are retained in an electronic database and hard copy files maintained by SPU staff.

Mike Hinson (206) 733 9134

3.11.3 CIP Support Monitoring

Hydrologic and Water Quality Monitoring of Natural Systems

In 2001, SPU completed an initial study of the hydrologic performance of its two pilot natural systems projects located in the Pipers Creek Watershed. Working in conjunction with the University of Washington, the study examined the hydrologic and hydraulic performance of the Viewlands swale and the Street Edge Alternative or SEA Street projects using post-construction monitoring. (See Section 3.12.1 for a description of these two sites.) In general, the studies indicated that the Viewlands Swale was able to attenuate runoff volumes generated from the 6-month, 24-hour storm event, and there was a roughly one-third decrease in flow volume from inlet to outlet based on the storm events measured during the monitoring period. Initial runoff analysis at the SEA Street location indicated that there was a reduction of over 95% over the monitoring period. Monitoring for water quality will be conducted as part of the Broadview Green Grid Natural System Project.

Beth Schmoyer (206) 386-1199.

CIP Performance Evaluation

During 2002 and the first half of 2003, SPU continued a long-range monitoring program for SPU creek restoration projects to determine whether or not they are meeting their design goals. (The type of monitoring conducted at each project site is driven by the goals of the project.) High priority in-stream construction projects are located in Pipers Creek, Thornton Creek, Longfellow Creek, Fauntleroy Creek and Taylor Creek. The following types of structures are monitored: log weirs, rock weirs, an "el-wood" structure, off-channel pools, bank protection, gravel introduction, pool addition, fish passage weirs, lunkers, root wads, and riparian replanting. The purpose of CIP effectiveness monitoring is to provide information on the level of improvement or protection afforded a water body as a result of the constructed system or BMP. This information will refine stormwater management decisions and advance the benefits gained by strategically investing in the most effective activities and projects.

The following table (Table 9) shows the distribution of new sites requiring monitoring through time. Each site is monitored intensively during the summer months and periodically during the rest of the year.

Table 9. Number of CIP Performance Sites

Year	No. of sites requiring monitoring
1999	8
2000	5
2001	3
2002	4
2003	4
Total	24

A technical report, summarizing the information gained from three years of monitoring for the sites constructed in 1999 was completed in April 2003.

Laura Reed (206) 615-0551

BMP Effectiveness Monitoring

Stormfilter Testing

The City of Seattle, along with Washington State Department of Transportation (WSDOT), and the City of Tacoma, is evaluating the performance of a Stormfilter system manufactured by Stormwater Management, Inc. The system, installed at the WSDOT I-5 test facility, is set up to conduct side by side testing of two filter media: a perlite/zeolite mix and a perlite/zeolite/granular activated carbon mix. Testing is scheduled to begin in August 2003 and continue through the 2003-2004 wet season. Samples will be collected during at least six storm events using a discrete flow composite method to enable the evaluation of pollutant removal efficiencies at target inflow rates. The Stormfilter system will be evaluated for its ability to remove standard stormwater pollutants (e.g., total suspended solids and total phosphorus), as well as metals, and organic compounds such as phthalates and petroleum hydrocarbons.

Beth Schmoyer (206) 386-1199.

Swirl Concentrator Testing

SPU is also evaluating the performance of a Downstream Defender, Vortechs, and Stormceptor swirl concentrator under a grant from Ecology. Field sampling at the Downstream Defender and Vortechs sites began in 2001 and sampling of the Stormceptor unit is scheduled to begin in September 2004. Samples are being analyzed for total suspended solids, total phosphorus, soluble reactive phosphorus, NWTPH-Dx, and metals (copper, lead, and zinc). The final project report is scheduled for 2004.

Beth Schmoyer (206) 386-1199.

Natural Drainage System Testing

SPU has also begun evaluating the performance of City-designed natural drainage systems (NDS) that have been installed to retrofit existing drainage systems in the Broadview-Greenwood area of north Seattle. These NDS are designed to provide both flow control (infiltration and detention) and water quality treatment (infiltration with some biofiltration). In 2003, monitoring stations were installed at the NW 107th and NW 120th St sites to begin evaluating pre-construction conditions. Samples are being analyzed for standard stormwater pollutants (total suspended solids, fecal coliform bacteria, total and dissolved metals, and NWTPH-Dx). In addition, Ecology has provided funding to analyze samples for pesticides. The project sampling

and analysis plan was reviewed and approved by Ecology in 2003.

The project design has been completed for the NW 107th St site and construction is expected to begin in 2004. Preliminary engineering is currently underway for the NW 120th St site. Post-construction monitoring to evaluate system performance will begin about 1 year after construction when the vegetation is well established.

SPU has also begun pre-construction testing at the High Point site, a Seattle Housing Authority project that will convert a 1940's era housing project to a mixed use area that will contain 1,600 housing units and community facilities such as a public library and medical/dental clinic. The project is being constructed in separate phases, with demolition and construction of the north end of the site occurring in 2003. The entire project is expected to be completed in late 2004. The project design will incorporate a number of innovative stormwater management technologies, including natural drainage system designs and porous pavement, along with a standard wet pond system. In 2003, a water quality monitoring station was installed in the drainage system immediately downstream of the project. Post-construction testing will be designed to evaluate the performance of individual stormwater management devices, and will be implemented following project completion.

Beth Schmoyer (206) 386-1199

3.11.4 ESA Information

Urban Blueprint for Habitat Protection and Restoration

Seattle's urban environment represents highly impacted habitats, requiring an adaptive management strategy to determine the best and most scientifically valuable actions to take. In June 2001, the City of Seattle completed a draft *Urban Blueprint for Habitat Protection and Restoration* and the final Blueprint is scheduled to be issued toward the end of 2003, following extensive public and peer review. Drawing on recent and groundbreaking research by City scientists and independent research scientists, the Urban Blueprint analyzes chinook salmon behavior within five extant aquatic environments within the city and identifies important habitat attributes to protect and restore. Future supplemental science reports will be issued as findings result from our continued research program.

Based upon the blueprint's findings and continuing research, the City of Seattle is continuing to focus on the following actions:

- Protecting the Puget Sound Shoreline. Protecting and restoring gravel beaches, eel grass beds and other shallow areas that provide plentiful food, refuge and spawning areas for other fish that chinook eat.
- Restoring Shallow Habitat along Lake Washington, Lake Union and the Ship Canal. Providing juvenile salmon with shallow shoreline areas, free of bulkheads and other structures, where they can feed and escape bass and other predators.
- Improving Shallow and Side-channel Habitats in the Industrial Duwamish Waterway. Restoring tidal flats, wetlands, side channels and other areas where juveniles can feed and rest, while growing and adjusting to saltwater.
- Making Migration through the Ballard Locks Safer. Developing ways for adult and juvenile salmon to get past the Locks quickly and unharmed.

- Updating Local Regulations. Among regulations under review are Seattle's critical area ordinance, storm water code, and shoreline master plan. The City's Comprehensive Plan will also incorporate where appropriate findings from the Blueprint and additional salmon habitat research findings.

The *Urban Blueprint for Habitat Protection and Restoration* report is available at <http://www.ci.seattle.wa.us/salmon/blueprintdoc.htm>.

Martin Baker (206) 684-5984

3.12 CAPITAL IMPROVEMENT PROGRAMS

In 2002, SPU constructed several Capital Improvement Program (CIP) projects that included water quality elements. Some of the principal projects are listed below.

Neil Thibert (206) 684-7589

3.12.1 Natural Systems

Seattle Public Utilities has developed a "Natural Systems" approach to managing stormwater in those basins whose drainage systems are based on ditches and culverts. This approach uses swales, infiltration, and landscaping techniques to reduce stormwater runoff, lower pollutant levels and, in many instances, improve general neighborhood quality.

Broadview Green Grid Project

The Broadview Green Grid project, involving 15 city blocks, is the most ambitious Natural Drainage System project to date. This natural infrastructure will manage stormwater flow from approximately 32 acres and is almost an entire sub-basin of the Pipers Creek Watershed. SPU is partnering with Seattle Department of Transportation (SDOT) to provide neighborhood improvements that integrate landscaping, traffic calming, and a sidewalk on each north-south street into the Natural Drainage System design. Common natural drainage features include swales, stormwater cascades, small wetland ponds, larger landscaped areas and smaller paved areas. These features help reduce the quantity and speed of the runoff water. This helps Pipers Creek by reducing the occurrence of large, fast flows of water that can damage the creek channel and habitat. Slowing the water down also gives maximum opportunity for stormwater to infiltrate back into the soil and water table, helping sustain the creek in the dry summer months. Slower stormwater flows and infiltration improve water quality by preventing roadway pollutants and pesticides from being transported downstream into Pipers Creek and Puget Sound. Construction is scheduled to begin in late August 2003. The project area includes a "Cascade" system planned for 107th Street, from 4th to Phinney Avenues, similar to the cascade constructed along 110th Street in 2002. Improvements similar to those of the "SEA Street" pilot project will be constructed along 2nd and 1st Avenues NW, and along Palatine and Phinney Avenues N, between 107th and 110th Streets.

Denise Andrews (206) 684-4601

High Point Project – A Natural Systems Approach

SPU is partnering with Seattle Housing Authority to incorporate natural drainage systems in the High Point mixed income redevelopment in West Seattle. Over 120 acres, High Point is located in the Longfellow Creek watershed, and makes up nearly 10% of the watershed. SHA's redevelopment project will replace the existing High Point development with new streets, new

utilities, and 1600 units of housing. The High Point Natural Drainage System Plan integrates over 11,000 linear feet of vegetated and grassy swales that are modified from the SEA Streets pilot to fit into a traditional curb-and-gutter street. Each swale will manage the runoff from the adjacent street and block of housing. In addition porous pavement sidewalks and up to three porous pavement streets (1st residential street application in the Northwest) will reduce the overall impervious surface of the redevelopment. Finally, design guidelines for the residential properties will include impervious surface reduction incentives and downspout dispersion techniques. The performance of the plan has been predicted based on a block-scale HSPF model. Model results indicate that the plan combined with the pond will meet Seattle's Stormwater Code for peak flow control as well as match the peak and duration for the 2-year pre-developed pasture condition. City Council has approved the Subdivision Master Use Permit and Street Vacations application. 100% Construction plans are scheduled to be submitted in November and approved by the City is anticipated in February 2004. Construction will begin Spring 2004 and run through 2006. Base monitors are in place at the discharge point and in Longfellow Creek to evaluate pre- and post-development flow and water quality.

Miranda Maupin (206) 386-9133

3.12.2 Urban Creeks – Urban Creeks Legacy

The Urban Creeks Legacy was initiated in 1999 to provide a holistic approach to managing stormwater drainage and improving habitat in Seattle's creeks. Working side-by-side with dedicated citizens, Seattle Public Utilities (SPU) achieved significant progress toward our program goals, which include:

- Improving creek drainage and water quality systems;
- Improving natural creek habitat for fish and other wildlife;
- Enhancing creek health through stewardship and education; and
- Celebrating our creeks and the citizens who care for them.

Among the accomplishments during 2002:

Thornton Creek Watershed. SPU substantially completed 3 detention ponds at Jackson Park Golf Course to reduce downstream flooding and protect downstream habitat from high flows. The project relocated and restored 2,300-ft of open channel and added native vegetation along the banks. SPU modified a culvert under Lake City Way to improve fish passage. For the first time in over fifty years, coho and sea-run cut-throat trout have been able to access an additional 2,000-ft of stream. SPU completed enhancement plans for Thornton Creek Park 6, a 6.5-acre natural area near the headwaters of the south branch. Working in partnership with Seattle Parks and Recreation, SPU and Parks purchased three lots along the south branch of Thornton Creek.

Longfellow Creek Watershed. SPU began design on a project to modify the remaining fish passage barriers along lower Longfellow Creek. The project will remove barriers, and improve instream habitat and riparian vegetation in the West Seattle Golf Course.

Taylor Creek Watershed. SPU continued to work on design and property negotiations to construct an improved, fish friendly culvert under Rainier Avenue South.

Fauntleroy Creek Watershed. SPU initiated design efforts to modify the creek to reduce erosion and sediment transport as well as improve instream habitat diversity.

Mapes Creek Watershed. SPU modified a failing headwall and regraded a steep slope and added native plants to the creek edge. SPU continued to assess the feasibility of restoring the mouth of Mapes Creek to benefit juvenile salmon.

SPU supported streamside vegetation projects in Licton Springs and Frink Park.

Chris Woelfel (206) 684-7599

3.12.3 Other Water Quality Projects

Westlake Drainage Project

In 2001, Seattle Public Utilities began construction of a project along Westlake Avenue near Lake Union to replace a failing drainage system and install several different stormwater treatment facilities. Incorporated into this project are access points for these facilities to allow for performance evaluation. These facilities will reduce pollutants entering Lake Union from stormwater runoff. Work on this project continued into 2002 and it is scheduled for completion in 2003.

Richard Smith (206) 684-5012

Jackson Park Detention

Three detention ponds with a total storage volume of 25 acre-feet were constructed adjacent to the north branch of Thornton Creek to reduce downstream flooding and erosion problems. To improve fish and wildlife habitat, approximately 2,300 feet of the creek channel was enhanced with large woody debris, rock and ponds. Native vegetation was planted and fish passage barriers removed. Approximately 2.5 acres of riparian wetland was created and enhanced with native vegetation. Design and restoration of golf course features were successfully coordinated with the Jackson Park Golf Course Master Plan to maintain playability, enhance the aesthetic appeal of the golf course, and increase efficiency of the irrigation system. This project was completed in 2003.

Gavin Patterson (206) 684-0126

4. OTHER PERMIT REPORTING REQUIREMENTS

4.1 LEGAL AUTHORITY

Adequate legal authority to control discharges to and from Seattle's storm drainage systems has been established. In 2000, revisions were made to the City's Stormwater, Grading and Drainage Control Code (Seattle Municipal Code 22.800 – 22.808). In August 2001, Ecology issued revised guidance in its Stormwater Management Manual for Western Washington. In early 2002, the City began a comprehensive comparison of its current set of Stormwater requirements to Ecology's newly revised guidance.

4.2 IMPLEMENTING STORMWATER PROGRAM COMPONENTS

All program components have been implemented and are proceeding in accordance with the

City's Stormwater Management Program (SWMP), as approved by Ecology on July 24, 1997.

4.3 KNOWN CHANGES IN WATER QUALITY

Based on the City's data, there were no known significant changes in the water quality of the City's receiving water bodies.

4.4 CONTROL OF INDUSTRIAL DISCHARGES INTO MS4s

Seattle's Stormwater, Grading and Drainage Control Code (SMC 22.800 – 22.808) prohibits most non-stormwater discharges from being introduced into the City's municipal storm sewer system, including harmful discharges from industrial activities. Seattle's Side Sewer Code (SMC 22.16.300) also prohibits discharging certain substances into the storm drain system. Additionally, as part of the City's Stormwater Pollution Prevention and Complaint Investigation Programs, Surface Water Quality Investigators conduct investigation when there is evidence of stormwater contamination originating from industrial discharges.

4.5 CHANGES IN PERMIT COVERAGE AREA

There were no changes in permit coverage area in 2002, and none are anticipated in 2003.

4.6 EXPENDITURES FOR STORMWATER PROGRAM

In July 1999, two year after Ecology approved Seattle's Stormwater Management Program, Seattle implemented a new financial management program called Summit. The primary driver behind the Summit Project was the year 2000 problem, which necessitated replacing the previous financial management program (Seattle Financial Management System, or SFMS). Transitioning from SFMS to Summit required developing an entirely new set of organizational, accounting and activity cost codes. In comparison to the data available when Seattle prepared its 1997 SWMP, the coding structure in Summit allows for a much more detailed accounting of budgeted and actual costs incurred. However, in many cases, specific stormwater program costs remain blended with other stormwater programs costs, making an accurate categorical breakdown difficult. This, coupled with organizational changes within SPU and other Seattle Departments since the 1997 SWMP was drafted, means that estimating stormwater program expenditures is both an objective and subjective exercise.

Table 10 provides a rough approximation of the actual overall stormwater management budget. Many City Departments other than SPU and SDOT are involved in programs that could arguably be included in these estimates. A good example would be the joint effort between the Department of Parks and Recreation and Office of Sustainability and the Environment reducing the use of pesticides in City parks. However, in keeping with the methodology used in previous reports, the estimates below are based primarily on SPU and SDOT expenditures. In many cases, owing to the internal organization of SPU, many general management and support functions are jointly funded by drainage, drinking water, wastewater and solid waste funds. In these cases, an assumed fraction of the total costs (typically 25% - 30%) was allocated to stormwater-related programs. It is not intended that these estimates serve as a modification of budget estimates made in previous reports. Instead, these estimates should be viewed as a refinement of the estimate provided in the past, but still a macro-scale analysis of stormwater program operating costs.

Table 10. Overall Stormwater Management Program Budget (Actual Expenditures)

Program	2002 Actual
Drainage O&M	\$ 4,039,000
Street O&M	\$ 1,611,000
Pollution Prevention Programs	\$ 430,000
Public Education Programs	\$ 751,000
Regulatory Development & Enforcement	\$ 612,000
Monitoring Program	\$ 423,000
Other Stormwater Program Costs	\$ 2,449,000
Overall Stormwater Program Budget	\$ 10,315,000

Drainage O&M: Includes SPU Field Operations Branch budgets for drainage inspection, drainage cleaning, and drainage repair, and an estimated portion of the overall branch support costs. Also included are expenses related to Conservation Corps and spot drainage program conducted by SPU.

Street O&M: Includes SDOT budgets for mechanical street sweeping, street flushing, alley flushing, and snow/ice response. Not included in the above table are budgets for litter pick-up (approximately \$1.4 million) and illegal dumping (approximately \$500,000).

Pollution Prevention Programs: Includes a variety of programs designed to reduce pollutants at their sources, primarily involving activities conducted by SPU's Community Services Division.

Public Involvement, Education & Stewardship Programs: Includes SPU's Water Quality Education program, Urban Creeks program, and Salmon Friendly Garden program.

Regulatory Development & Enforcement: Includes estimated SPU costs for water quality complaint investigations, and business inspections. It also includes the work begun in 2002 to evaluate Seattle's codes and technical standards in comparison to Ecology's 2001 Manual.

Monitoring Program: Includes expenditures for surface water quality monitoring.

Other Stormwater Program Costs: Includes estimated proportions of general program management, WRIA Planning, and other support and planning costs. They do not include ESA (\$2.5 million) programs.

Robert Chandler (206) 684-7597

4.7 REVISIONS TO FISCAL ANALYSIS

In accordance with Section S9 of Seattle's NPDES Municipal Stormwater permit, a permit modification is required if there is a greater than 20-percent difference between the *projected* annual budget value contained in the City's SWMP (Table 9.7 in the 1997 SWMP) and the actual budget *adopted* by the City Council for that year. The projected annual budgets contained in Seattle's 1997 SWMP ended with fiscal year of 2000. For comparison purposes, the projected figure for 2000 was \$5,885,474.

5. CLOSING COMMENTS

Seattle's urban landscape differs from many surrounding communities in that *new development* is quite rare. Additionally, Seattle has a very low rate of *redevelopment*, where an urban property undergoes change but retains its urban land use. In fact, Seattle's rate of redevelopment is less than 1 percent per year. Furthermore, of these redevelopment projects, only a fraction of them are large enough to trigger regulations requiring stormwater treatment and/or flow control facilities. This means that while development regulations play a role in reducing adverse impacts of stormwater runoff, progress toward improving the quality of Seattle's urban must include:

- A suite of stormwater programs aimed at reducing pollutants at or near their sources;
- An on-going maintenance and operations program designed to keep our infrastructure operating properly; and
- A municipal capital improvement program based on placing the appropriate technologies at targeted locations.

Looking ahead, we are committed to better understanding how best to utilize the above techniques of urban stormwater management. Seattle, with its fully built urbanized environment, is in a distinctive position to implement and evaluate new and unique stormwater management strategies. In some areas of the City, for example where the drainage system is primarily ditches and culverts, an increasing emphasis is being placed on targeted retrofits using a natural system design approach. In other areas of the City, where more formalized curb and gutter drain systems are present, a set of programs focusing on infrastructure maintenance and pollution prevention actions may be the most cost-effective approach for improving water quality. Over time we will continue to adjust and enhance our efforts as our knowledge increases and the state-of-the-practice improves.

The City of Seattle has been involved in managing stormwater runoff since the late 1800s, when the first drainage systems were constructed in response to typhoid and diphtheria epidemics and recurring damage caused by flooding. Stormwater management has evolved since those early days and the City has expanded the level of service beyond flood control and human health risks, embracing actions that aim to improve overall surface water quality and enhance aquatic habitats. We remain committed to meeting the challenges of managing stormwater in our urban environment today and into the future.

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APPENDIX A - STORMWATER MANAGEMENT PROGRAM MANAGERS

Stormwater Management Program	Program Manager
Aquatic Community Assessment Program	Laura Reed (206) 615-0551
Basin & Creek GIS Delineation	Scott Reese (206) 733-9172
BMP Effectiveness Monitoring	Beth Schmoyer (206) 386-1199
Broadview Green Grid Project	Denise Andrews (206) 684-4601
Business and Industry Recycling Venture	Ellen Stewart (206)615-0023
Business Inspection Program	Ellen Stewart (206) 615-0023
Capital Improvement Programs	Neil Thibert (206) 684-7589
CIP Support Monitoring	Beth Schmoyer (206) 386-1199.
Citizen Advisory Committee	Carlton Stinson (206) 684-7624
Comprehensive Creek Inventory	Joe Starstead (206) 684-7877
Comprehensive Drainage Plan Update	Darla Inglis (206) 233-7160
Coordination among NPDES Municipal Stormwater Permittees	Robert Chandler (206) 684-7597
Creek Steward Program	Bob Spencer (206) 684-4163
Densmore Drainage Basin	Sahba Mohandessi (206) 684-7592
Ditch and Culvert Inventory	Keith Kurko (206) 233-1516
Drainage and Wastewater Line of Business	Denise Andrews (206) 684-4601
Drainage Maintenance Crew Training – Standard Operating Procedures	Shanti Colwell (206) 386-1501
Drainage Plans and Permit Approval	Ken Watanabe (206) 233-7912
Drainage System Inspection Program	Ellen Stewart (206) 615-0023, Louise Kulzer (206) 733-9162
Environmental Education Team	Anthony Matlock (206) 386-9746
Environmental Grant Funding	Anthony Matlock (206) 386-9746
ESA Regional Roads Maintenance Program	Sandy Gurkewitz (206) 684-8574
ESA Team	Martin Baker (206) 684-5984
GIS Support	Harvey Arnone (206) 233-0028
Green Gardening Program	Carl Woestwin (206) 684-4684
Green Home Kit Program	Michael Davis (206) 615-1376
Hazardous Material Inventory	John Labadie (206) 684-8311
Hazardous Material Reduction	Shab Zand (206) 233-5172
High Point Project – A Natural Systems Approach	Miranda Maupin (206) 386-9133
Household Hazardous Waste Program	Kathy Minsch (206) 615-1441
Hydrologic and Water Quality Monitoring of Natural Systems	Beth Schmoyer (206) 386-1199.
Illegal Dumping	Alex Tonel (206) 684-4170
Interagency Regulatory Analysis Committee	Ellen Stewart (206) 615-0023
Jackson Park Detention	Gavin Patterson (206) 684-0126
Lake Union Action Team	Robert Chandler (206) 684-7597
Local Hazardous Waste Management Program	Kathy Minsch (206) 615-1441
Longfellow Creek Investigation	Beth Schmoyer (206) 386-1199
Longfellow Creek Watershed Project	Sheryl Shapiro (206) 233-2046
Lower Duwamish River Sediment Cleanup and Restoration	Martin Baker (206) 684-5984

Appendix A - Stormwater Management Program Managers (continued)

Stormwater Management Program	Program Manager
Lower Duwamish Waterway Source Control Program	Beth Schmoyer (206) 386-1199 & Tanya Treat (206) 615-1636.
Natural Drainage System Testing	Beth Schmoyer (206) 386-1199
Natural Lawn and Garden Care Campaign/Natural Soil Building	Carl Woestwin (206) 684-4684
Norfolk Drainage Basin	Beth Schmoyer (206) 386-1199
Operations & Maintenance of Drainage System	Pat Gorham (206) 386-9730
Operations and Maintenance of Roadways	Jim Dare (206) 684-5319
Pesticide Free Parks	Barb Decaro (206) 615-1660 or Tracy Dieckhoner (206) 386-4595
Pesticide Reduction	Tracy Dieckhoner (206) 386-4595
Pipers Creek Watershed Project	Beth Miller (206) 684-0877
Precipitation Monitoring	Hirod Gill (206) 615-0826
Pollution Prevention Direction-finding	Louise Kulzer (206) 733-9162
Salmon in the Schools	Carlton Stinson (206) 684-7624
South Park Drainage Basin	Sahba Mohandessi (206) 684-7592
SPU Spill Coordinator/Response Program	John Labadie (206) 684-8311
Storm Drain Stenciling/Oil Spill Program	Carlton Stinson (206) 684-7624
Storm Event Sampling	Mike Hinson (206) 733 9134
Stormfilter Testing	Beth Schmoyer (206) 386-1199.
Stormwater Structural BMP Mapping	Keith Kurko (206) 233-1516
Stormwater, Grading and Drainage Control Code and Directors' Rules	Robert Chandler (206) 684-7597
Surface Water Quality Database	Mike Hinson (206) 733 9134
Taylor Creek and Deadhorse Canyon	Tom Gannon (206) 684-8565 & <i>Bob Spencer (206) 684-4163</i>
Thornton Creek – Basin-wide Flow Control Plan	Neil Thibert (206) 684-7589
University of Washington Center for Water and Watershed Studies	Darla Inglis (206) 233-7160
Urban Blueprint for Habitat Protection and Restoration	Martin Baker (206) 684-5984
Urban Creeks – Urban Creeks Legacy	Chris Woelfel (206) 684-7599
Urban Creeks and Watershed Stewardship Team	Kathy Minsch (206) 615-1441
Water Quality Basin Studies	Beth Schmoyer (206) 386-1199.
Water Quality Complaints	Ellen Stewart (206) 615-0023
Westlake Drainage Project	Richard Smith (206) 684-5012
Watershed Forums	Sarah McKearnan, WRIA 8 (206) 615-0567; Judith Noble, WRIA 9 (206) 684-8078.
Watershed Resource Inventory Area (WRIA) Coordination	Sarah McKearnan, WRIA 8 (206) 615-0567; Judith Noble, WRIA 9 (206) 684-8078; <i>Scott Powell, WRIA 7 (206) 386-4582; Ed Connor, WRIAs 3&4 (206) 615-1128</i>

APPENDIX B – PERMIT REPORTING REQUIREMENTS CROSS-REFERENCE

The table below cross-references the reporting requirements contained in the 1995 NPDES Municipal Stormwater Permit with the appropriate sections contained in this report.

Permit Reporting Requirement	Req't No.	Cross-referenced Section in this Report
Status of implementing the components of the stormwater management program.	S10.B.1	3.1 - Comprehensive Stormwater Planning (p. 7) 3.3 - Regulations & Technical Standards (p. 13) 3.6 - Illicit Discharges (p. 24) 3.8 - Operations & Maintenance of Drainage System (p. 31) 3.9 - Operations and Maintenance of Roadways (p. 31) 3.10 - Municipal Training (p. 32) 3.11 - Information & Data Collection, Management & Analysis (p. 33) 3.12 - Capital Improvement Programs (p. 41) 4.1 - Legal Authority (p. 43)
Changes in permit coverage area:	S10.B.2	4.5 - Changes in Permit Coverage Area (p. 44)
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Revisions to fiscal analysis	S10.B.4	4.7 - Revisions to Fiscal Analysis (p. 45)
Summary and analysis of cumulative monitoring data (4th Year Report only)	S10.B.5	Not applicable
Summary of compliance activities, inspections, and education activities	S10.B.6	3.4 - Permitting, Inspections & Enforcement (p. 14) 3.4.6 - Lower Duwamish Waterway Source Control Program (p. 18) 3.7 - Public Involvement, Education, Stewardship (p. 25)
Known changes in water quality	S10.B.7	4.3 - Known Changes in Water Quality (p. 44)
Status of watershed-wide coordination activities	S10.B.8	3.2 - Partnerships (p. 10)